## AGENDA

Standards Council Meeting

August 10-13, 2020

| 20-8-1 | Report of the Committee Membership Task Group (J. Quiter, Chair). |
| 20-8-1-a | Act on pending applications for Committee Members. No Attachment |
| 20-8-1-b | IEEE Board of Governors Resolutions. No Attachment |
| 20-8-2 | Report of the Policy and Procedures Task Group (J. Foisel, Chair). No Attachment |
| 20-8-2-a | Overview of electronic Technical Session platform and procedures. No Attachment |
| 20-8-3 | Report of the April 2020 Minutes and June 2020 special revision cycle ballot. No Attachment |

### AMENDMENTS

**20-8-4 NFPA 1**

Act on the issuance of NFPA 1, *Fire Code*, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with three amendments and no appeals.

- 20-8-4-a CAM 1-3: Accept an Identifiable Part of Public Comment No. 7. CAM 1-3 passed vote of the participating Membership during the NFPA Technical Meeting. PASSED TC Ballot – 30 voting members/21 agree/3 disagree/1 abstained/5 ballots not returned. See Attachment 20-8-4-a

- 20-8-4-b CAM 1-6: Accept Public Comment No. 34. CAM 1-6 passed vote of the participating Membership during the NFPA Technical Meeting of the NFPA Technical Meeting. PASSED TC Ballot – 30 voting members/18 agree/7 disagree/0 abstained/5 ballots not returned. See Attachment 20-8-4-b

- 20-8-4-c CAM 1-9: Accept Public Comment No. 33. CAM 1-9 passed vote of the participating Membership during the NFPA Technical Meeting of the NFPA Technical Meeting. PASSED TC Ballot – 30 voting members/17 agree/8 disagree/0 abstained/5 ballots not returned. See Attachment 20-8-4-c

- 20-8-4-d APPEAL Consider the Appeal of Julie Heckman, APA, requesting that the NFPA Standards Council delete Paragraph 65.3 from NFPA 1, 2021 edition to be consistent with Standards Council Decision 14-1 and direction from the Standards Council. See Attachment 20-8-4-d

- 20-8-4-d-1 Comment received by C. Stashak, TC Member, Fire Code Committee, regarding the appeal on the issuance of NFPA 1, 2021 edition. See Attachment 20-8-4-d-1

- 20-8-4-e Review inconsistent language as a result of Tech Session and TIAs with NFPA 101. No Attachment

**20-8-5 NFPA 4**


- 20-8-5-a CAMs 4-1/4-5: Reject Second Revision No. 4. CAMs 4-5/4-5 passed vote of the participating Membership of the NFPA Technical Meeting. No Ballot Necessary See Attachment 20-8-5-a

**20-8-6 NFPA 30**

Act on the issuance of NFPA 30, *Flammable and Combustible Liquids Code*, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals.

**20-8-7 NFPA 30A**


NOTE: CAM 30A-5 was withdrawn by the submitter in favor of pursing a TIA. See Agenda Item 20-8-30.
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>20-8-8</td>
<td>Act on the issuance of NFPA 99, <em>Health Care Facilities Code</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments and no appeals.</td>
</tr>
<tr>
<td>20-8-9-a</td>
<td>CAMs 101-10/101-20: Reject Second Revision No. 6587 Including any Related Portions of First Revision and First Correlating Revisions. CAMs 101-10/101-20 passed vote of the participating Membership of the NFPA Technical Meeting. <strong>No Ballot Necessary</strong> See Attachment 20-8-9-a</td>
</tr>
<tr>
<td>20-8-9-b</td>
<td>CAMs 101-11/101-21: Reject Second Revision No. 6588 Including any Related Portions of First Revision and First Correlating Revisions. CAMs 101-11/101-21 passed vote of the participating Membership of the NFPA Technical Meeting. <strong>No Ballot Necessary</strong> See Attachment 20-8-9-b</td>
</tr>
<tr>
<td>20-8-10</td>
<td>Act on the issuance of NFPA 790, <em>Standard for Competency of Third-Party Field Evaluation Bodies</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals.</td>
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<tr>
<td>20-8-11</td>
<td>Act on the issuance of NFPA 1006, <em>Standard for Technical Rescue Personnel Professional Qualifications</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. <strong>No Attachment</strong></td>
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<tr>
<td>20-8-12</td>
<td>Act on the issuance of NFPA 1500, <em>Standard on Fire Department Occupational Safety, Health, and Wellness Program</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. <strong>No Attachment</strong></td>
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<td>20-8-13</td>
<td>Act on the issuance of NFPA 1700, <em>Guide for Structural Fire Fighting</em>, with an issuance date of August 11, 2020 and an effective date of August 31, 2020, as acted on at the NFPA Technical Meeting, with no amendments (CAM failed) and no appeals. <strong>No Attachment</strong></td>
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<tr>
<td><strong>TENTATIVE INTERIM AMENDMENTS</strong></td>
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<tr>
<td>20-8-14</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 90A in NFPA 1 of the 2021 edition of NFPA 1, <em>Fire Code</em> (TIA No. 1491).</td>
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<tr>
<td>20-8-14-a</td>
<td>Text of proposed TIA No. 1491. See Attachment 20-8-14-a</td>
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<tr>
<td>20-8-14-b</td>
<td>Ballot results of TIA No. 1491. PASSED ballot on both technical merit and emergency nature – 30 voting members/22 agree on technical merit/0 disagree/0 abstained/ 8 ballots not returned/22 agree on emergency nature/0 disagree/0 abstained/8 ballots not returned. See Attachment 20-8-14-b</td>
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<td>20-8-14-c</td>
<td>No comments were received. <strong>No Attachment</strong></td>
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<td>20-8-15</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 220 in NFPA 1 of the 2021 edition of NFPA 1, <em>Fire Code</em> (TIA No. 1492).</td>
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<td>20-8-15-a</td>
<td>Text of proposed TIA No. 1492. See Attachment 20-8-15-a</td>
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<td>20-8-15-b</td>
<td>Ballot results of TIA No. 1492. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-15-b</td>
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<td>No comments were received. <strong>No Attachment</strong></td>
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<td>20-8-16</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 303 in NFPA 1 of the 2021 edition of NFPA 1, <em>Fire Code</em> (TIA No. 1493).</td>
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<td>20-8-16-a</td>
<td>Text of proposed TIA No. 1493. See Attachment 20-8-16-a</td>
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<td>20-8-16-b</td>
<td>Ballot results of TIA No. 1493. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-16-b</td>
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<td>20-8-17-c</td>
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<td>Text of proposed TIA No. 1494. See Attachment 20-8-17-a</td>
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<td>20-8-17-b</td>
<td>Ballot results of TIA No. 1494. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-17-b</td>
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<td>20-8-18-a</td>
<td>Text of proposed TIA No. 1495. See Attachment 20-8-18-a</td>
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<td>Ballot results of TIA No. 1495. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-18-b</td>
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<td>No comments were received. No Attachment</td>
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<td>20-8-19-a</td>
<td>Text of proposed TIA No. 1496. See Attachment 20-8-19-a</td>
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<td>Ballot results of TIA No. 1496. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-19-b</td>
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<td>No comments were received. No Attachment</td>
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<td>Text of proposed TIA No. 1497. See Attachment 20-8-20-a</td>
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<td>Ballot results of TIA No. 1497. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-20-b</td>
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<td>No comments were received. No Attachment</td>
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<td>Text of proposed TIA No. 1498. See Attachment 20-8-21-a</td>
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<td>20-8-21-b</td>
<td>Ballot results of TIA No. 1498. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/ 9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-21-b</td>
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<td>No comments were received. No Attachment</td>
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<td>20-8-22-a</td>
<td>Text of proposed TIA No. 1499. See Attachment 20-8-22-a</td>
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<td>Ballot results of TIA No. 1499. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-22-b</td>
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<td>Text of proposed TIA No. 1499. See Attachment 20-8-22-a</td>
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<td>20-8-22-b</td>
<td>Ballot results of TIA No. 1499. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-22-b</td>
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<td>No comments were received. No Attachment</td>
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<td>20-8-23</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to update the extracted language from NFPA 30A in NFPA 1 of the 2021 Edition of NFPA 1, Fire Code (TIA No. 1500).</td>
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<td>20-8-23-a</td>
<td>Text of proposed TIA No. 1500. See Attachment 20-8-23-a</td>
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<td>20-8-23-b</td>
<td>Ballot results of TIA No. 1500. PASSED ballot on both technical merit and emergency nature – 30 voting members/21 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/21 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. See Attachment 20-8-23-b</td>
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<td>No comments were received. No Attachment</td>
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<td>20-8-24</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise the title of Table 25.9.2.3.1 of the 2019 Edition of NFPA 13, Standard for the Installation of Sprinkler Systems (TIA No. 1489).</td>
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<td>20-8-24-a</td>
<td>Text of proposed TIA No. 1489. See Attachment 20-8-24-a</td>
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<td>20-8-24-b</td>
<td>Ballot results of TIA No. 1489. PASSED ballot on both technical merit and emergency nature – 36 voting members/32 agree on technical merit/0 disagree/0 abstained/4 ballots not returned/32 agree on emergency nature/0 disagree/0 abstained/4 ballots not returned. PASS CC ballot on both correlation and emergency nature – 21 voting members/17 agree on correlation/0 disagree/0 abstained/4 ballot not returned/17 agree on emergency nature/0 disagree/0 abstained/4 ballots not returned. See Attachment 20-8-24-b</td>
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<td>No comments were received. No Attachment</td>
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<td>20-8-25-a</td>
<td>Text of proposed TIA No. 1506. See Attachment 20-8-25-a</td>
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<tr>
<td>20-8-25-b</td>
<td>Ballot results of TIA No. 1506. PASSED ballot on both technical merit and emergency nature – 31 voting members/21 agree on technical merit/1 disagree/0 abstained/9 ballots not returned/21 agree on emergency nature/1 disagree/0 abstained/9 ballots not returned. PASS CC ballot on both correlation and emergency nature – 21 voting members/17 agree on correlation/2 disagree/0 abstained/2 ballot not returned/18 agree on emergency nature/1 disagree/0 abstained/2 ballots not returned. See Attachment 20-8-25-b</td>
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<td>20-8-25-c</td>
<td>Two comments were received (1 Support/1 Oppose). See Attachment 20-8-25-c</td>
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<td>20-8-26</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise Sections 3.3.34.3 and A.3.3.34.3 of the proposed 2021 Edition of NFPA 30, Flammable and Combustible Liquids Code (TIA No. 1503).</td>
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<td>20-8-26-a</td>
<td>Text of proposed TIA No. 1503. See Attachment 20-8-26-a</td>
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<td>20-8-26-b</td>
<td>Ballot results of TIA No. 1503. PASSED ballot on both technical merit and emergency nature – 22 voting members/22 agree on technical merit/0 disagree/0 abstained/0 ballots not returned/20 agree on emergency nature/2 disagree/0 abstained/0 ballots not returned, PASS CC ballot on both correlation and emergency nature – 13 voting members/12 agree on correlation/0 disagree/0 abstained/1 ballot not returned/11 agree on emergency nature/1 disagree/0 abstained/1 ballots not returned. See Attachment 20-8-26-b</td>
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<td>20-8-26-c</td>
<td>No comments were received. No Attachment</td>
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<td>20-8-27</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise text of Figure 16.4.1(c) of the 2021 Edition of NFPA 30, Flammable and Combustible Liquids Code (TIA No. 1507).</td>
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<tr>
<td>20-8-28-a</td>
<td>Text of proposed TIA No. 1508. See Attachment 20-8-28-a</td>
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<td>20-8-28-b</td>
<td>Ballot results of TIA No. 1508. PASSED ballot on both technical merit and emergency nature – 33 voting members/29 agree on technical merit/1 disagree/1 abstained/2 ballots not returned/28 agree on emergency nature/1 disagree/0 abstained/3 ballots not returned. PASS CC ballot on both correlation and emergency nature –13 voting members/10 agree on correlation/0 disagree/0 abstained/3 ballots not returned/10 agree on emergency nature/0 disagree/0 abstained/3 ballot not returned. See Attachment 20-8-28-b</td>
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<td>20-8-28-c</td>
<td>No comments were received. No Attachment</td>
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<td>20-8-29-a</td>
<td>Text of proposed TIA No. 1509. See Attachment 20-8-29-a</td>
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<td>20-8-29-b</td>
<td>Ballot results of TIA No. 1509. PASSED ballot on both technical merit and emergency nature – 33 voting members/28 agree on technical merit/1 disagree/1 abstained/3 ballots not returned/28 agree on emergency nature/1 disagree/1 abstained/3 ballots not returned. See Attachment 20-8-29-b</td>
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<td>No comments were received. No Attachment</td>
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<tr>
<td>20-8-30-a</td>
<td>Text of proposed TIA No. 1511. See Attachment 20-8-30-a</td>
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<td>20-8-30-b</td>
<td>Ballot results of TIA No. 1511. FAILED ballot on both technical merit and emergency nature – 33 voting members/14 agree on technical merit/13 disagree/2 abstained/4 ballots not returned/12 agree on emergency nature/16 disagree/1 abstained/4 ballots not returned. See Attachment 20-8-30-b</td>
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<td>20-8-30-c</td>
<td>7 Comments were received (7 Support). See Attachment 20-8-30-c</td>
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<tr>
<td>20-8-31-a</td>
<td>Text of proposed TIA No. 1480. See Attachment 20-8-31-a</td>
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<td>20-8-31-b</td>
<td>Ballot results of TIA No. 1480. PASSED ballot on both technical merit and emergency nature – 36 voting members/31 agree on technical merit/0 disagree/1 abstained/4 ballots not returned/31 agree on emergency nature/0 disagree/1 abstained/4 ballots not returned. See Attachment 20-8-31-b</td>
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<td>20-8-31-c</td>
<td>Two comments were received (1 Support/1 Oppose). See Attachment 20-8-31-c</td>
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<td>20-8-32-a</td>
<td>Text of proposed TIA No. 1516. See Attachment 20-8-32-a</td>
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<td>20-8-32-b</td>
<td>Ballot results of TIA No. 1516. PASSED ballot on both technical merit and emergency nature – 36 voting members/30 agree on technical merit/1 disagree/0 abstained/5 ballots not returned/29 agree on emergency nature/2 disagree/0 abstained/5 ballots not returned. See Attachment 20-8-32-b</td>
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<td><strong>20-8-33-a</strong></td>
<td>Text of proposed TIA No. 1505. See Attachment 20-8-33-a</td>
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<td><strong>20-8-33-b</strong></td>
<td>Ballot results of TIA No. 1505. PASSED ballot on both technical merit and emergency nature – 29 voting members/18 agree on technical merit/0 disagree/0 abstained/11 ballots not returned/17 agree on emergency nature/0 disagree/1 abstained/11 ballots not returned. See Attachment 20-8-33-b</td>
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<tr>
<td><strong>20-8-33-c</strong></td>
<td>No comments were received. No Attachment</td>
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<td><strong>20-8-34</strong>&lt;br&gt;NFPA 70</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise Paragraphs 6.27.5 and 6.30.5.1356.10 Item (8) of the 2020 Editions of NFPA 70, <em>National Electrical Code</em>® (TIA No. 1502).</td>
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<td><strong>20-8-34-a</strong></td>
<td>Text of proposed TIA No. 1502. See Attachment 20-8-34-a</td>
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<td><strong>20-8-34-b</strong></td>
<td>Ballot results of TIA No. 1502. PASSED Panel Ballot on both technical merit and emergency nature – 13 voting members/11 agree on technical merit/0 disagree/0 abstained/2 ballots not returned/11 agree on emergency nature/0 disagree/0 abstained/2 ballots not returned. PASSED CC ballot on both correlation and emergency nature –11 voting members/11 agree on correlation/0 disagree/0 abstained/0 ballot not returned/11 agree on emergency nature/0 disagree/0 abstained/0 ballot not returned. See Attachment 20-8-34-b</td>
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<td><strong>20-8-34-c</strong></td>
<td>Two comments were received (1 Support/1 Oppose). See Attachment 20-8-34-c</td>
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<td><strong>20-8-35-a</strong></td>
<td>Text of proposed TIA No. 1501. See Attachment 20-8-35-a</td>
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<td><strong>20-8-35-b</strong></td>
<td>Ballot results of TIA No. 1501. PASSED TC Ballot on both technical merit and emergency nature – 16 voting members/11 agree on technical merit/1 disagree/3 abstained/1 ballot not returned/11 agree on emergency nature/0 disagree/4 abstained/1 ballot not returned. PASSED CC ballot on both correlation and emergency nature –12 voting members/9 agree on correlation/0 disagree/3 abstained/0 ballot not returned/9 agree on emergency nature/0 disagree/3 abstained/0 ballot not returned. See Attachment 20-8-35-b</td>
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<td><strong>20-8-35-c</strong></td>
<td>One comment was received (Support). See Attachment 20-8-35-c</td>
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<td><strong>20-8-36</strong>&lt;br&gt;NFPA 1006</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to move sections 10.3.1, 10.3.2 and 10.3.3 to section 10.2 of the 2021 Edition of NFPA 1006, <em>Standard for Technical Rescue Personnel Professional Qualifications</em> (TIA No. 1488).</td>
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<td><strong>20-8-36-a</strong></td>
<td>Text of proposed TIA No. 1488. See Attachment 20-8-36-a</td>
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<td><strong>20-8-36-b</strong></td>
<td>Ballot results of TIA No. 1488. PASSED TC Ballot on both technical merit and emergency nature – 29 voting members/18 agree on technical merit/0 disagree/1 abstained/10 ballots not returned/19 agree on emergency nature/0 disagree/0 abstained/10 ballots not returned. PASSED CC ballot on both correlation and emergency nature –21 voting members/15 agree on correlation/0 disagree/0 abstained/6 ballot not returned/15 agree on emergency nature/0 disagree/0 abstained/6 ballot not returned. See Attachment 20-8-36-c</td>
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<td><strong>20-8-36-c</strong></td>
<td>No comments were received. No Attachment</td>
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<td><strong>20-8-37</strong>&lt;br&gt;NFPA 1192</td>
<td>Act on the issuance of proposed Tentative Interim Amendment (TIA) to delete 1.3.3 in its entirety from the 2021 Edition of NFPA 1192, <em>Standard on Recreational Vehicles</em> (TIA No. 1490).</td>
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<td><strong>20-8-37-a</strong></td>
<td>Text of proposed TIA No. 1490. See Attachment 20-8-37-a</td>
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<td><strong>20-8-37-b</strong></td>
<td>Ballot results of TIA No. 1490. PASSED TC Ballot on both technical merit and emergency nature – 21 voting members/16 agree on technical merit/2 disagree/1 abstained/2 ballots not returned/17 agree on emergency nature/2 disagree/0 abstained/2 ballots not returned. See Attachment 20-8-37-b</td>
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<td>No comments were received. No Attachment</td>
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<tr>
<td>20-8-38</td>
<td><strong>NFPA 1581</strong> Act on the issuance of proposed Tentative Interim Amendment (TIA) to add new Section 8.4.10 and associated Annex information to the 2015 and proposed 2021 Editions of NFPA 1581, <em>Standard on Fire Department Infection Control Program</em> (TIA No. 1517).</td>
</tr>
<tr>
<td>20-8-38-a</td>
<td>Text of proposed TIA No. 1517. See Attachment 20-8-38-a</td>
</tr>
<tr>
<td>20-8-38-b</td>
<td>Ballot results of TIA No. 1517. PASSED TC Ballot on both technical merit and emergency nature – 34 voting members/27 agree on technical merit/0 disagree/0 abstained/7 ballots not returned/27 agree on emergency nature/0 disagree/0 abstained/7 ballots not returned. See Attachment 20-8-38-b</td>
</tr>
<tr>
<td>20-8-38-c</td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td>20-8-39</td>
<td><strong>NFPA 1851</strong> Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise 7.3.3.2 and add new Annex A.7.3.3.2 to the 2020 Edition of NFPA 1851, <em>Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting</em> (TIA No. 1484).</td>
</tr>
<tr>
<td>20-8-39-a</td>
<td>Text of proposed TIA No. 1484. See Attachment 20-8-39-a</td>
</tr>
<tr>
<td>20-8-39-b</td>
<td>Ballot results of TIA No. 1484. PASSED TC Ballot on both technical merit and emergency nature – 35 voting members/27 agree on technical merit/0 disagree/0 abstained/8 ballots not returned/27 agree on emergency nature/0 disagree/0 abstained/8 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 28 voting members/20 agree on correlation/0 disagree/0 abstained/8 ballot not returned/20 agree on emergency nature/0 disagree/0 abstained/8 ballot not returned. See Attachment 20-8-39-b</td>
</tr>
<tr>
<td>20-8-39-c</td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td>20-8-40</td>
<td><strong>NFPA 1851</strong> Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise figure 7.1.1.2(b) of the 2020 Edition of NFPA 1851, <em>Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting</em> (TIA No. 1504).</td>
</tr>
<tr>
<td>20-8-40-a</td>
<td>Text of proposed TIA No. 1504. See Attachment 20-8-40-a</td>
</tr>
<tr>
<td>20-8-40-b</td>
<td>Ballot results of TIA No. 1504. PASSED TC Ballot on both technical merit and emergency nature – 36 voting members/28 agree on technical merit/0 disagree/0 abstained/8 ballots not returned/28 agree on emergency nature/0 disagree/0 abstained/8 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 27 voting members/19 agree on correlation/0 disagree/0 abstained/8 ballot not returned/19 agree on emergency nature/0 disagree/0 abstained/8 ballot not returned. See Attachment 20-8-40-b</td>
</tr>
<tr>
<td>20-8-40-c</td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td>20-8-41</td>
<td><strong>NFPA 1851</strong> Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise 11.1.5 of the 2020 Edition of NFPA 1851, <em>Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting</em> (TIA No. 1512).</td>
</tr>
<tr>
<td>20-8-41-a</td>
<td>Text of proposed TIA No. 1512. See Attachment 20-8-41-a</td>
</tr>
<tr>
<td>20-8-41-b</td>
<td>Ballot results of TIA No. 1512. PASSED TC Ballot on both technical merit and emergency nature – 36 voting members/27 agree on technical merit/0 disagree/0 abstained/9 ballots not returned/27 agree on emergency nature/0 disagree/0 abstained/9 ballots not returned. PASSED CC ballot on both correlation and emergency nature – 27 voting members/19 agree on correlation/0 disagree/0 abstained/8 ballot not returned/19 agree on emergency nature/0 disagree/0 abstained/8 ballot not returned. See Attachment 20-8-41-b</td>
</tr>
<tr>
<td>20-8-41-c</td>
<td>No comments were received. No Attachment</td>
</tr>
<tr>
<td>20-8-42-a</td>
<td>Text of proposed TIA No. 1514. See Attachment 20-8-42-a</td>
</tr>
<tr>
<td>20-8-42-b</td>
<td>Ballot results of TIA No. 1514. PASSED TC Ballot on both technical merit and emergency nature – 17 voting members/14 agree on technical merit/0 disagree/0 abstained/3 ballots not returned/14 agree on emergency nature/0 disagree/0 abstained/3 ballots not returned. PASSED</td>
</tr>
</tbody>
</table>
CC ballot on both correlation and emergency nature –27 voting members/20 agree on correlation/0 disagree/0 abstained/7 ballot not returned/20 agree on emergency nature/0 disagree/0 abstained/7 ballot not returned. See Attachment 20-8-42-b

20-8-43 Act on the issuance of proposed Tentative Interim Amendment (TIA) to revise specific paragraphs in Chapter 1 of the 2018 Edition of NFPA 2112, Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire (TIA No. 1513).

20-8-43-a Text of proposed TIA No. 1513. See Attachment 20-8-43-a

20-8-43-b Ballot results of TIA No. 1513. PASSED TC Ballot on both technical merit and emergency nature – 20 voting members/16 agree on technical merit/0 disagree/0 abstained/4 ballots not returned/16 agree on emergency nature/0 disagree/0 abstained/4 ballots not returned. See Attachment 20-8-43-b

20-8-43-c One comment was received (Opposed). See Attachment 20-8-43-c

20-8-44 Consider processing of TIA regarding storable pools in prior editions of NFPA 70. See Attachment 20-8-44

**REVISION CYCLE**

20-8-45 Consider requests from NFPA Committees to change the respective revision schedules as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NFPA 11</td>
<td>2016</td>
<td>PI Closing June 1, 2021</td>
</tr>
<tr>
<td>NFPA 14</td>
<td>2019</td>
<td>PI Closing January 1, 2021</td>
</tr>
<tr>
<td>NFPA 58</td>
<td>2020</td>
<td>PI Closing January 1, 2021</td>
</tr>
<tr>
<td>NFPA 59A</td>
<td>2019</td>
<td>PI Closing January 1, 2021</td>
</tr>
</tbody>
</table>

See Attachment 20-8-45

**SCOPES**

20-8-46 Discussion re NFPA 1/101 valet trash committee responsibility. No Attachment

20-8-47 At the April 2020 meeting, the Standards Council reviewed the request of the Technical Committee on Energy Storage Systems to review the potential scope overlap of NFPA 855, Energy Storage Systems with other NFPA occupancy standards. After review of all information before it, the Council voted to direct NFPA Staff to form a Task Group to be Chaired by Standards Council Member, Jeff Foisel including one member from each of the potentially affected NFPA projects identified (namely NFPA 70, 75, 76, 110, 111, 850 and 855). The Task Group has been established and have met three times. Update on the Task Group’s work to be presented by Chair, Jeff Foisel can be found in Attachment 20-8-47

20-8-47-a Consider correspondence from Michel O’Brian, IAFC, related to the potential scope overlap of NFPA 855. See Attachment 20-8-47-a

**NEW PROJECTS**

20-8-48 Review request of the Technical Committee on Emergency Medical Services Protective Clothing and Equipment (FAE-EMS) and the Technical Committee on Hazardous Materials Protective Clothing and Equipment (FAE-HAZ) to revise Standards Council approval to include NFPA 1999, Standard on Protective Clothing and Ensembles for Emergency Medical Operations, within consolidated standard NFPA 1990, Standards for Protective Ensembles for Hazardous Material and Emergency Medical Operations, and to allow necessary second revisions to remove NFPA 1999 text from NFPA 1990 during the current revision cycle. See Attachment 20-8-48

20-8-49 The Fire Test Committee is recommending to no longer pursue the development of the 16 ft. Parallel Panel test. The task group presented their draft to the Fire Test Committee during the First Draft meeting and made a motion to submit the draft to the Standards Council for issuance
<table>
<thead>
<tr>
<th>Fire Test TG re 16 Ft Parallel Panel Test</th>
<th>in a cycle. That motion failed. A follow up motion was made to cease work on the new project. That motion passed. As a result, the chair disbanded the task group and has forwarded the Committee’s recommendation to Council. See Attachment 20-8-49</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-8-50 NFPA 715</td>
<td>Consider the request of the Technical Committee on Fuel Gas Warning Equipment to approve the preliminary draft of NFPA 715, <em>Standard for the Installation of Fuel Gases Detection and Warning Equipment</em>. If approved, the Technical Committee also requests the Standard to be entered into its initial revision cycle, with a Public Input closing date of October 15, 2020, if approved. See Attachment 20-8-50</td>
</tr>
<tr>
<td>20-8-51 NFPA 915</td>
<td>Consider the request of the Technical Committee on Remote Inspections to approve proposed draft standard NFPA 915, <em>Standard for Remote Inspections</em>. The Technical Committee also requests the Standard be entered into its initial revision cycle, with a Public Input closing date of June 1, 2021, if approved. See Attachment 20-8-51</td>
</tr>
<tr>
<td>20-8-52 NFPA 2800</td>
<td>Consider the request of the Technical Committee on Building Fire and Life Safety Directors to approve proposed draft standard NFPA 2800, <em>Standard for Emergency Action Planning</em>. The Technical Committee also requests the Standard be entered into its initial revision cycle, with a Public Input closing date of January 6, 2021, if approved. See Attachment 20-8-52</td>
</tr>
<tr>
<td>20-8-53</td>
<td>Discussion regarding new project on food producing vehicles. See Attachment 20-8-53</td>
</tr>
<tr>
<td>REPORTS BACK TO COUNCIL</td>
<td></td>
</tr>
<tr>
<td>20-8-54 Research foundation report on FM</td>
<td>At the August 2019 meeting, the Council heard a report from Council Member Gary Keith on Factory Mutual’s Research Technical Report on the Evaluation of Sprinkler Fire Protection of Retail Sales of Consumer Fireworks (<a href="https://www.fmglobal.com/research-and-resources/research-and-testing/research-technical-reports">https://www.fmglobal.com/research-and-resources/research-and-testing/research-technical-reports</a>). After a review of all of the material, the Council voted to forward FM’s Technical Report to the NFPA Research Foundation with a request for an analysis of whether the test performed by FM is consistent with the test plan previously developed by the Research Foundation. The Research Foundation has completed their review and analysis as requested and is reporting back to the Council. See Attachment 20-8-54</td>
</tr>
<tr>
<td>20-8-55</td>
<td>The Council voted to approve the dates of upcoming Council meetings, as follows: December 2-3, 2020 TBD April 2021 TBD</td>
</tr>
</tbody>
</table>
MEMORANDUM

(AMENDMENT)

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: July 23, 2020

SUBJECT: Final Results - Amendment 1-3 Letter Ballot on the Proposed 2021 Edition of NFPA 1

In accordance with the Regulations Governing the Development of NFPA Standards, the final results show the Amendment HAS achieved the 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee. As a result, the recommendation to the Standards Council is to Accept an Identifiable Part of Public Comment No. 7.

30 Members Eligible to Vote
5 Ballots Not Returned (Christopherson, Day, Laramee, Myers, Taulbee)

The number of votes needed to recommend approval of the Association Action is 16. (30 eligible to vote - 5 not returned - 1 abstention = 24 × 0.66 = 15.84)

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote.

The final debate report, voting results and comments from the 2020 NFPA Tech Session are available at www.nfpa.org/2020techsession.

In accordance with 1.6.2.(b) of the Regs, anyone who is dissatisfied with the results from the 2020 NFPA Tech Session may appeal the results. Appeals shall be filed no later than 5 days after the notice of the amendment ballot final results are published.

The final date to file any such appeal is July 28, 2020.
### NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
### AMENDMENT BALLOT NO. 1-3 - FINAL RESULTS

**Amendment No. 1-3: Accept an Identifiable Part of Public Comment No. 7. Note: A DISAGREE vote would recommend previous edition text. Where no previous edition text exists the text is simply deleted.**

Eligible to Vote: 30  
Not Returned: 5  
Brent L. Christopherson, Scott T. Laramee, Richard L. Day, Steven Taulbee, Philip Myers

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>John A. Sharry</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>I agree with the action that was taken during the Technical Meeting. This is Directed Vote of the Automatic Fire Alarm Association (AFAA).</td>
</tr>
<tr>
<td>Marvin Dwayne Garriss</td>
<td></td>
<td>I Agree, this will coordinate the requirements of NFPA 1 with the revised extract material from NFPA 101 TC.</td>
</tr>
<tr>
<td>Raymond C. O’Brocki</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Richard G. Kluge</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>H. Butch Browning, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td></td>
<td>I agree with using both Test Method 1 and 2 of ASTM E3082.</td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>agreed</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>Agree with the Membership</td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td></td>
<td>No objection to the proposed language.</td>
</tr>
<tr>
<td>F. Tom Fangmann</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>This will coordinate the requirements of NFPA 1 with the revised extract material from NFPA 101.</td>
</tr>
<tr>
<td>Brian L. Olsen</td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>

| DISAGREE | 2 |
| Ty Darby | Disagree |
Carl F. Baldassarra  
**ABSTAIN**  
Kenneth Earl Tyree, Jr.

There is insufficient technical basis for this change.

1

Neutral Opinion on matter
AMENDMENT BALLOT No. 1-3

Technical Committee on Fire Code

NFPA 1, Fire Code

June 30, 2020

IF YOU AGREE TO SUPPORT AMENDMENT 1-3 as recommended by the NFPA membership by vote at Tech Session, the recommended text reads as follows (changes shown legislatively to the Second Draft):

10.13.9.5 Fire Retardant Treatments For Natural Cut Trees

Whenever a fire retardant treatment is applied to natural cut trees, that fire retardant treatment shall have been tested by an approved agency and shall be labeled as complying with both Test Method 1 and Test Method 2 of ASTM E3082.

Please Note: This section may need to be relocated to accommodate the changes in TIA 1497.

IF YOU DISAGREE WITH THE RECOMMENDATION FOR AMENDMENT 1-3 by the NFPA membership by vote at Tech Session, the recommended text (i.e. previous edition text) is shown clean below. If no previous edition text exists, the text supported by the membership vote is simply deleted.

No previous edition text.
MEMORANDUM

(AMENDMENT)

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: July 23, 2020

SUBJECT: Final Results - Amendment 1-3 Letter Ballot on the Proposed 2021 Edition of NFPA 1

In accordance with the Regulations Governing the Development of NFPA Standards, the final results show the Amendment HAS achieved the 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee. As a result, the recommendation to the Standards Council is to Accept an Identifiable Part of Public Comment No. 7.

30 Members Eligible to Vote
5 Ballots Not Returned (Christopherson, Day, Laramee, Myers, Taulbee)

The number of votes needed to recommend approval of the Association Action is 16. (30 eligible to vote - 5 not returned - 1 abstention = 24 × 0.66 = 15.84)

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote.

The final debate report, voting results and comments from the 2020 NFPA Tech Session are available at www.nfpa.org/2020techsession.

In accordance with 1.6.2.(b) of the Regs, anyone who is dissatisfied with the results from the 2020 NFPA Tech Session may appeal the results. Appeals shall be filed no later than 5 days after the notice of the amendment ballot final results are published.

The final date to file any such appeal is July 28, 2020.
## NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
### AMENDMENT BALLOT NO. 1-6 - FINAL RESULTS

Amendment No. 1-6: Accept Public Comment No. 34. Note: A DISAGREE vote would recommend previous edition text. Where no previous edition text exists the text is simply deleted.

<table>
<thead>
<tr>
<th>Eligible to Vote: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned: 5</td>
</tr>
<tr>
<td>Brent L. Christopherson, Scott T. Laramée, Richard L. Day, Steven Taulbee, Philip Myers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td>I agree</td>
<td></td>
</tr>
<tr>
<td>Richard G. Kluge</td>
<td>I agree.</td>
<td></td>
</tr>
<tr>
<td>Raymond C. O’Brocki</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Ty Darby</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>F. Tom Fangmann</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td>The Automatic Fire Alarm Association Codes and Standards Steering Committee has completed a full review of the written record in regards to Amendment 1-6. Upon this review, and in particular with the results of the affirmative votes, it has been directed that our vote be changed from a Disagree to Agree.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DISAGREE</th>
<th>8</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>John A. Sharry</td>
<td>There is little analysis to justify increased distance for a 13R sprinkler system. The change is not properly justified.</td>
<td></td>
</tr>
</tbody>
</table>
Sarina L. Hart  
The original Committee action should remain, allowing the 450 ft distance only for 13 and 13D systems.

Marvin Dwayne Garriss  
The NFPA 1 Technical Committee debated this issue and agreed to restrict the distance permitted from fire department access and buildings protected by automatic sprinkler systems designed in accordance with NFPA 13R. 13 R is life safety system not a property protection system and thus the increased travel from 300 to 450 feet is not warranted.

Richard Jay Roberts  
Accepting PC-34 would decrease the overall level of safety of occupants, and communities.

Kenneth E. Bush  
The NFPA 1 Technical Committee debated this issue and agreed to restrict the distance permitted from fire department access and buildings protected by automatic sprinkler systems designed in accordance with NFPA 13R. I agree with the TC’s assessment that sufficient hazards from unprotected combustible concealed spaces exist in these buildings which warrant these stricter provisions. The potential for large-loss fires due to fire spread in these spaces has shown that more aggressive fire department intervention is needed in order to control these fires, limit property loss, and enhance the safety of first responders to these incidents. It is the clear intent of the Scope of NFPA 1 to consider these protection features.

Kelly T. Nicolello  
13 R is life safety system not a property protection system. The increased travel from 300 to 450 feet is not warranted nor supported by any scientific analysis.

Wade Palazini  
The fire department access road requirement was revised from 450 feet to 300 feet to account for the exception in NFPA 13R that permits attics to be not protected by sprinklers. The reduction from 450 feet to 300 feet would give a responding fire department greater access to the building to deal with an uncontrolled fire in an attic. The requirements for NFPA 13D were not revised because the size of a building protected by an NFPA 13D building will generally be limited by the scope of the standard (one or two family dwelling).
I am changing my vote from the Agree to Disagree on circulation. The comments by Nicolello, Bush, Palazini and Clary are persuasive. There is a demonstrated addition of risk we have seen from significant fires in concealed combustible spaces that are non-fire sprinkler protected. In Central Florida, we see numerous fires occurring in these concealed combustible spaces from lightening strikes. Because these attic spaces are concealed combustible spaces, these fires are extremely difficult for firefighters to access and frequently result in the fire department moving to defensive operations. Defensive operations require fire apparatus to have greater proximate access to these non-fire sprinkler protected concealed combustible space structures than a combustible concealed space that is fire sprinkler protected. These fires also create added risk exposure for firefighters. The increase allowances that have been allowed in the height and area tables in the model building codes has also created added demonstrated risk that no longer justifies the current language.
AMENDMENT BALLOT No. 1-6

Technical Committee on Fire Code

NFPA 1, Fire Code

June 30, 2020

IF YOU AGREE TO SUPPORT AMENDMENT 1-6 as recommended by the NFPA membership by vote at Tech Session, the recommended text reads as follows (changes shown legislatively to the Second Draft):

18.2.3.2.2.1

Where buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13R, or NFPA 13D, the distance in 18.2.3.2.2 shall be permitted to be increased to 450 ft (137 m).

18.2.3.2.2.2

Where buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13R, the distance in 18.2.3.2.2 shall be permitted to be increased to 300 ft (91 m).

IF YOU DISAGREE WITH THE RECOMMENDATION FOR AMENDMENT 1-6 by the NFPA membership by vote at Tech Session, the recommended text (i.e. previous edition text) is shown clean below. If no previous edition text exists, the text supported by the membership vote is simply deleted.

18.2.3.2.2.1

When buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13D, or NFPA 13R, the distance in 18.2.3.2.2 shall be permitted to be increased to 450 ft (137 m).

(Note: No previous existing text in 18.2.3.2.2.2)
MEMORANDUM

(AMENDMENT)

TO:     Technical Committee on Fire Code

FROM:   Kelly Carey, Technical Committee Administrator

DATE:   July 23, 2020

SUBJECT: Final Results - Amendment 1-9 Letter Ballot on the Proposed 2021 Edition of NFPA 1

In accordance with the Regulations Governing the Development of NFPA Standards, the final results show the Amendment HAS achieved the 2/3 majority vote needed to recommend approval of the Association Action by the Technical Committee. As a result, the recommendation to the Standards Council is to Accept Public Comment No. 33.

30 Members Eligible to Vote
5 Ballots Not Returned (Christopherson, Day, Laramee, Myers, Taulbee)

The number of votes needed to recommend approval of the Association Action is 17. (30 eligible to vote - 5 not returned - 0 abstentions = 25 × 0.66 = 16.5)

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote.

The final debate report, voting results and comments from the 2020 NFPA Tech Session are available at www.nfpa.org/2020techsession.

In accordance with 1.6.2.(b) of the Regs, anyone who is dissatisfied with the results from the 2020 NFPA Tech Session may appeal the results. Appeals shall be filed no later than 5 days after the notice of the amendment ballot final results are published.

The final date to file any such appeal is July 28, 2020.
### NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
### AMENDMENT BALLOT NO. 1-9 - FINAL RESULTS

Amendment No. 1-9: Accept Public Comment No. 33. Note: A DISAGREE vote would recommend previous edition text. Where no previous edition text exists the text is simply deleted.

**Eligible to Vote:** 30  
**Not Returned:** 5  
Brent L. Christopherson, Scott T. Laramee, Richard L. Day, Steven Taulbee, Philip Myers

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<tr>
<th>Vote Selection</th>
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</thead>
<tbody>
<tr>
<td><strong>AGREE</strong></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I agree</td>
</tr>
<tr>
<td>Richard G. Kluge</td>
<td></td>
<td>I agree.</td>
</tr>
<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Ty Darby</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>Agree!</td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>F. Tom Fangmann</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Brian L. Olsen</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kenneth Earl Tyree, Jr.</td>
<td></td>
<td>This gives additional accountability to the property owner to remedy the deficiencies noted.</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>Agree with the membership</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td><strong>DISAGREE</strong></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The owner should be responsible for maintaining ITM documentation. While I agree a record of citations/deficiencies should be kept by the AHJ, copies of all supporting documentation associated with the deficient condition and its resolution are not necessary for proper documentation. Additionally, each AHJ should be held to their jurisdiction's records retention policy.
Marvin Dwayne Garriss  
I disagree. This new requirement for the AHJ to maintain building records is not realistic. As with most codes they records should be maintained by the owner and available to the AHJ upon request.

Richard Jay Roberts  
Accepting PC-33 will place undue and excessive burden on AHJs

John A. Sharry  
The fire code is not the location to require fire inspection record disposition requirements. This will place an administrative and financial burden on Fire Marshals and Code Enforcement Agencies.

Kelly T. Nicolello  
The fire code is not the location to require fire prevention/inspection administrative record disposition requirements. EVERY department has a record disposition requirement set by their jurisdiction. The fire code should not override that.

Shane M. Clary  
I disagree with the action that was taken in regards to this amendment during the Technical Meeting conducted within the Zoomosphere. The original action that was taken by the NFPA 1 Technical Committee needs to be maintained, which is to resolve the inclusion of the proposed text into the Code. The documents in question should be maintained by the building owner and not the AHJ. This is a directed vote of the Automatic Fire Alarm Association (AFAA).

Anthony C. Apfelbeck  
I stand by the TC's original position on this PC. Justification: 1. This language is much more appropriate for NFPA 25 and NFPA 72. 2. As the language that is specific to systems, the placement in 1.11.1.1 is inappropriate. It should be placed in Chapter 13. 3. If the language was to remain in Chapter 1, it is not appropriate as a subsection to 1.11.1.1. It should be a separate section under 1.11. 4. The section does not give any indication as to how long the record should be kept. Is it kept until the deficiency is corrected, 5 years, 20 years, or forever? As currently written, it states the AHJ shall keep every record of every fire protection system deficiency that has ever been noted forever.
This new requirement for the AHJ to maintain building records is not realistic in several ways. For many occupancies, multiple AHJs, such as fire authorities, licensing agencies, and insurance carriers, exist. As proposed, there would be confusion as to which of these AHJs would be the primary party responsible to maintain these records and how such information would be available and exchanged among multiple and diverse AHJs. This information would be more easily accessible if it is maintained by the building ownership. As written, this requirement poses a confusing and uncertain record retention scenario.
**AMENDMENT BALLOT No. 1-9**

**Technical Committee on Fire Code**

*NFPA 1, Fire Code*

*June 30, 2020*

---

**IF YOU AGREE TO SUPPORT AMENDMENT 1-9 as recommended by the NFPA membership by vote at Tech Session,** the recommended text reads as follows *(changes shown legislatively to the Second Draft)*:

**1.11.1.1**

Documents requested from a property owner for fire protection systems with deficiencies shall be maintained by the AHJ.

---

**IF YOU DISAGREE WITH THE RECOMMENDATION FOR AMENDMENT 1-9 by the NFPA membership by vote at Tech Session,** the recommended text *(i.e. previous edition text)* is shown clean below. If no previous edition text exists, the text supported by the membership vote is simply deleted.

*No previous edition text.*
May 27, 2020

Appellant: American Pyrotechnics Association
Julie L. Heckman, Executive Director
7910 Woodmont Avenue, Suite 1220
Bethesda, MD 20814

Statement of Appealed Action: Issuance of NFPA 1-2021 with FR-34 (new paragraph 65.3)

Argument In Support of the Appeal:

FR-34 is in direct conflict with the Decision of the Standards Council #14-1 which states that “no NFPA Committees should develop standards for the storage and retail sales of consumer fireworks or for the use of fireworks by members of the public. The language of FR-34 prohibits the use of consumer fireworks by the public.

APA Code Consultant, William Koffel, participated in the Second Draft meeting of the Technical Committee. During the Committee meeting, the Committee Chair and the Staff Liaison raised the issue to the Committee. During the Committee discussion, Mr. Koffel also spoke in favor of a Second Revision to delete Paragraph 65.3 that was added by FR-34. By a split vote, the Committee chose to retain Paragraph 65.3. Some Committee members indicated that if the language was inconsistent with the Standards Council, the Council should remove the text. This Appeal provides the Council with the opportunity to do just that.

During the October 2019 First Draft meeting of the NFPA Technical Committee on Pyrotechnics, a motion was made to revise the PYR Committee Scope to re-insert the consumer fireworks into the Committee Scope. The motion passed and the Committee’s request was sent to the Council. During the December 2019 meeting of the Standards Council, the Council voted to deny the Committee’s request (Agenda Item 19-12-17). The minutes of the meeting clearly reflect that the Council “determined and clearly articulated that no Technical Committees are currently authorized to develop standards for the storage and retail sales of consumer fireworks or for the use of fireworks by members of the public.” Continuing to include Paragraph 65.3 in NFPA 1-2020 is in direct conflict with the Council’s Decision and direction.

In an attempt to resolve the issue, APA’s Code Consultant submitted a NITMAM to reject FR-34. As expected, the Council determined that the NITMAM was not in accordance with the Regulations. As such, this Appeal is necessary to revise NFPA 1-2020 to be consistent with the previous Decision and direction from the Council.

Precise Relief Requested: The Appellant requests that the Standards Council delete Paragraph 65.3 from NFPA 1-2020.

Hearing On The Appeal: The APA respectfully requests a hearing on the Appeal.

Respectfully Submitted,

American Pyrotechnics Association

Julie L. Heckman
Executive Director
TO: Standards Council

CC: Dawn Michelle Bellis

FROM: Catherine Stashak, Office of the Illinois State Fire Marshal, On behalf of the NFPA Fire Code Technical Committee (FCC-AAA)

DATE: July 10, 2020

SUBJECT: Chair Statement on NFPA 1 Appeal from Julie L. Heckman, American Pyrotechnics Association

The NFPA Fire Code Technical Committee (TC) Chair, Ken Bush, is currently a member of the NFPA Standards Council. The current staff liaison, Tracy Vecchiarelli has asked me, a member of the TC, to prepare the chair report on the committee’s behalf to avoid any conflicts of interest.

The FCC-AAA TC reviewed PI-6 during the First Draft meeting and developed FR-34 based on the proposed language to prohibit the use of consumer fireworks by the public. The PI attempted to define a way to safely use consumer fireworks (e.g. separation distances from structures, protective gear, safety measures). The TC had a lengthy debate on this issue and ultimately decided that there is no safe way for the public to use consumer fireworks, which aligns with the Standards Council Decision. AHJs are currently left without any code provisions to point to in order to prohibit the use of consumer fireworks which has led to a number of states and jurisdictions developing their own set of guidelines. To resolve this, the TC created FR-34 on a new section 65.3 Use of Consumer Fireworks, prohibiting their use. The FR passed ballot with one abstention, no negatives, and no comments.

During the Second Draft meeting, the TC further discussed the Standards Council decision. It was agreed that should the Standards Council determine the language is in violation of their decision, they should have the authority to remove it. No public comments were submitted and no Second Revisions were made.
MEMORANDUM

(AMENDMENT)

TO: Technical Committee on Commissioning and Integrated Testing

FROM: Elena Carroll, Sr. Technical Committee Administrator

DATE: June 30, 2020

SUBJECT: Proposed 2021 Edition of NFPA 4

During the NFPA Technical Meeting (Tech Session) electronic voting period held June 22 - 26, 2020, NFPA 4 was recommended for issuance with the following:

Amendment 4-1 and 4-5: To Reject Second Revision No. 4

Pursuant to Section 4.6 and Table 1 of the Regulations Governing the Development of NFPA Standards (Regs), the following are not subject to committee ballot:

- An Amendment to Reject a Second Revision where no First Revision or related part of a First Revision exists.

The final debate report, voting results and comments from the 2020 Tech Session are available at www.nfpa.org/2020techsession.

In accordance with 1.6.2.(a) of the Regs, anyone who is dissatisfied with the results from the 2020 NFPA Tech Session may appeal the results. Appeals shall be filed no later than 20 days after the posting of the Tech Session results for CAMs for which the Association action for issuance of the Standard was recommended.

The final date to file any such appeal is July 19, 2020.
MEMORANDUM

(AMENDMENT)

TO: Correlating Committee on Safety to Life

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 30, 2020


During the NFPA Technical Meeting (Tech Session) electronic voting period held June 22 - 26, 2020, NFPA 101 was recommended for issuance with the following:

**Amendment 101-10 / 101-20: Reject Second Revision No. 6587 Including any Related Portions of First Revisions and First Correlating Revisions**

Pursuant to Section 4.6 and Table 1 of the *Regulations Governing the Development of NFPA Standards (Regs)*, the following is not subject to committee ballot:

- An Amendment to Reject a Second Revision and related portions of a First Revisions and First Correlating Revisions

The final debate report, voting results and comments from the 2020 Tech Session are available at [www.nfpa.org/2020techsession](http://www.nfpa.org/2020techsession).

In accordance with 1.6.2.(a) of the *Regs*, anyone who is dissatisfied with the results from the 2020 NFPA Tech Session may appeal the results. Appeals shall be filed no later than 20 days after the posting of the Tech Session results for CAMs for which the Association action for issuance of the Standard was recommended.

The final date to file any such appeal is **July 19, 2020**.
MEMORANDUM
(AMENDMENT)

TO: Correlating Committee on Safety to Life

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 30, 2020


During the NFPA Technical Meeting (Tech Session) electronic voting period held June 22 - 26, 2020, NFPA 101 was recommended for issuance with the following:

Amendment 101-11 / 101-21: Reject Second Revision No. 6588 Including any Related Portions of First Revisions and First Correlating Revisions

Pursuant to Section 4.6 and Table 1 of the Regulations Governing the Development of NFPA Standards (Regs), the following is not subject to committee ballot:

- An Amendment to Reject a Second Revision and related portions of a First Revisions and First Correlating Revisions

The final debate report, voting results and comments from the 2020 Tech Session are available at www.nfpa.org/2020techsession.

In accordance with 1.6.2.(a) of the Regs, anyone who is dissatisfied with the results from the 2020 NFPA Tech Session may appeal the results. Appeals shall be filed no later than 20 days after the posting of the Tech Session results for CAMs for which the Association action for issuance of the Standard was recommended.

The final date to file any such appeal is July 19, 2020.
SEE ATTACHED FOR REVISIONS

**Substantiation:** The current text of NFPA 1 contains extracts from the last published edition of NFPA 90A but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 90A in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

**Emergency Nature:** The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
2.4 References for Extracts in Mandatory Sections.

13.7.4.1.5.3
Where smoke detectors required by Section 6.4 of NFPA 90A are installed in a building not equipped with an approved fire alarm system as specified by 13.7.4.1.5.2, the following shall occur:

(1) Smoke detector activation required by Section 6.4 of NFPA 90A shall cause a visual signal and an audible signal in a normally occupied area.
(2) Smoke detector trouble conditions shall be indicated visually or audibly in a normally occupied area and shall be identified as air duct detector trouble.

[90A:6.4.4.3]
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1491 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
8 Not Returned (Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>22 Agree (w/comment, Hanselka)</td>
<td>22 Agree (w/comment, Clary, Peterkin)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible} \div 2 = 15 + 1 = (16)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 17.

\[(30 \text{ eligible to vote} - 8 \text{ not returned} - 0 \text{ abstentions} = 22 \times 0.75 = 16.5)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 23, 2020.
# NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE

## PROPOSED TIA NO. 1491 BALLOT - FINAL RESULTS

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1491 on Section 13.7.4.1.5.3 for 90A extract updates to NFPA 1, Proposed 2021 edition.

**Eligible to Vote:** 30  
**Not Returned:** 8  
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, Marvin Dwayne Garriss

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agree</strong></td>
<td>22</td>
<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John A. Sharry</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Wade Palazini</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>This makes sense all buildings do not have full fire alarms systems</td>
</tr>
<tr>
<td>Scott T. Laramee</td>
<td></td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kenneth Earl Tyree, Jr.</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>H. Butch Browning, Jr.</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1491 on Section 13.7.4.1.5.3 for 90A extract updates to NFPA 1, Proposed 2021 edition.</td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Brian L. Olsen</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td><strong>Disagree</strong></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Abstain</strong></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 30
Not Returned: 8
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, Marvin Dwayne Garriss

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>22</td>
<td>These extracted text changes should be included with this upcoming edition.</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td></td>
<td>A, B, C and D</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td></td>
<td>B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>John A. Sharry</td>
<td></td>
<td>A &amp; B</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>A and B</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>Needed in the field</td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td></td>
<td>F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Raymond C. O’Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
</tbody>
</table>
Kenneth Earl Tyree, Jr.  
A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

H. Butch Browning, Jr.  
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.‘.

Cesar Lujan  
The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen  
B.

Scott T. Laramee  
Agree

Disagree  
0

Abstain  
0
**SEE ATTACHED FOR REVISIONS**

**Substantiation:** The current text of NFPA 1 contains extracts from the last published edition of NFPA 220 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 220 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
Chapter 2 Referenced Publications

2.4 References for Extracts in Mandatory Sections.


A.12.2.1

Building construction types are defined in NFPA 220. The following material is extracted verbatim from NFPA 220 and is included here as a convenience for users of this Code. Any requests for Formal Interpretations (FIs) or Tentative Interim Amendments (TIAs) on the following material should be directed to the Technical Committee on Building Construction. See Table A.12.2.1 for fire resistance ratings for each building construction type.

Table A.12.2.1 Fire Resistance Ratings for Type I through Type V Construction (hr)

<table>
<thead>
<tr>
<th>Construction Element</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Type V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>442</td>
<td>332</td>
<td>222</td>
<td>111</td>
<td>000</td>
</tr>
<tr>
<td>Exterior Bearing Walls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting more than one floor, columns, or other bearing walls</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0b</td>
</tr>
<tr>
<td>Supporting one floor only</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0b</td>
</tr>
<tr>
<td>Supporting a roof only</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0b</td>
</tr>
<tr>
<td>Interior Bearing Walls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting more than one floor, columns, or other bearing walls</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Supporting one floor only</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Supporting roofs only</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Columns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting more than one floor, columns, or other bearing walls</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Supporting one floor only</td>
<td>3</td>
<td>2</td>
<td>2</td>
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Note: H = heavy timber members (see NFPA 220 text for requirements).

aSee NFPA 5000, 7.3.2.1.

bSee NFPA 5000, Section 7.3.

cSee 4.3.2.12, 4.4.2.3, and 4.5.6.8 of NFPA 220.
Type I and Type II Construction. Type I (442 or 332) and Type II (222, 111, or 000) construction shall be those types in which the fire walls, structural elements, walls, arches, floors, and roofs are of approved noncombustible or limited-combustible materials. [220:4.3.1]

Type III Construction. Type III (211 or 200) construction shall be that type in which exterior walls and structural elements that are portions of exterior walls are of approved noncombustible or limited-combustible materials, and in which fire walls, interior structural elements, walls, arches, floors, and roofs, are entirely or partially of wood of smaller dimensions than required for Type IV construction or are of approved noncombustible, limited-combustible, or other approved combustible materials. [220:4.4.1]

Type IV Construction. Type IV (2HH) construction shall be that type in which fire walls, exterior walls, and interior bearing walls and structural elements that are portions of such walls are of approved noncombustible or limited-combustible materials, except as allowed for exterior walls in 4.5.6.7 of NFPA 220. Other interior structural elements, arches, floors, and roofs shall be of solid or laminated wood or cross-laminated timber without concealed spaces or with concealed spaces conforming to 4.5.4 of NFPA 220 and shall comply with the allowable dimensions of 4.5.5 of NFPA 220. [220:4.5.1]

Type V (111 or 000) Construction. Type V (111 or 000) construction shall be that type in which structural elements, walls, arches, floors, and roofs are entirely or partially of wood or other approved material. [220:4.6]

Annex F Informational References

F.3 References for Extracts in Informational Sections.
MEMORANDUM

TO:        Technical Committee on Fire Code
FROM:      Kelly Carey, Technical Committee Administrator
DATE:      June 18, 2020
SUBJECT:   NFPA 1 Proposed TIA No. 1492 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

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<tr>
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<th>Emergency Nature:</th>
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<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>21 Agree (w/comment: Hanselka, Peterkin)</td>
<td>21 Agree (w/comment, Clary, Hanselka, Peterkin)</td>
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<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
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</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible} \div 2 = 15 + 1 = (16)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 16.

\[(30 \text{ eligible to vote} - 9 \text{ not returned} - 0 \text{ abstentions} = 21 \times 0.75 = 15.75)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
**NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE**  
**PROPOSED TIA NO. 1492 BALLOT - FINAL RESULTS**

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1492 on various 220 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

Eligible to Vote: 30  
Not Returned: 9  
F. Tom Fangmann, Brent L. Christoperson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, H. Butch Browning, Jr., Marvin Dwayne Garriss

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<td>Peter J. Willse</td>
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<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
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<td>Scott T. Laramee</td>
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<td>Kelly T. Nicolello</td>
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<td>Raymond C. O’Brocki</td>
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<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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**QUESTION NO. 2:** I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 30  
Not Returned: 9
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, H. Butch Browning, Jr., Marvin Dwayne Garriss

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James S. Peterkin
These extracted text changes should be included with this upcoming edition.

Peter J. Willse
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Shane M. Clary
The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.

Catherine L. Stashak
A

Anthony C. Apfelbeck
A, B, C and D

Richard Jay Roberts
B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard."

Carl F. Baldassarra
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Kenneth E. Bush
The standard contains an error or an omission that was overlooked during the regular revision process.

Scott M. Bryant
B

Sarina L. Hart
A

John A. Sharry
A & B

Robert J. Davidson
A and B

Reinhard Hanselka
The need for code consistency and distance to exposures is important

Wade Palazini
E

Terin Hopkins
F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Kelly T. Nicolello
Agree

Raymond C. O'Brocki
The standard contains an error or an omission that was overlooked during the regular revision process.
A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen

B.

Scott T. Laramee

I agree

<table>
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<th>Disagree</th>
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SEE ATTACHED FOR REVISIONS

**Substantiation:** The current text of NFPA 1 contains extracts from the last published edition of NFPA 303 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 303 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
2.4 References for Extracts in Mandatory Sections.

28.1.1.3
Section 28.1 shall not apply to a private, non-commercial docking facility constructed or occupied for the use of the owners or residents of the associated single-family dwelling. [303:1.1.3]

28.1.2.1.1.1
Placement, Selection and installation of portable fire extinguishers shall be in accordance with Chapter 5 of NFPA 10 unless otherwise permitted by 28.1.2.1.1.1.1, 28.1.2.1.1.2, or 28.1.2.1.1.3. [303:6.2.1.1.1]

28.1.2.1.1.1.1
Placement of portable fire extinguishers on piers and along bulkheads where vessels are moored or are permitted to be moored shall meet the following criteria:

(1) Extinguishers listed for Class A, Class B, and Class C fires shall be installed at the pier/land intersection on a pier that exceeds 25 ft (7.62 m) in length.
(2) Additional fire extinguishers shall be placed such that the maximum travel distance to an extinguisher does not exceed 75 ft (22.86 m).
(3) Extinguishers shall be protected from environmental exposures to prevent damage and lack of operability.

[303:6.2.1.1.1]

28.1.2.1.1.2 [Moved from 28.1.2.1.1.4]
All extinguishers installed on piers shall meet the rating requirements set forth in Chapter 5 of NFPA 10 for ordinary (moderate) hazard type. [303:6.1.1.1.2]

28.1.2.1.1.32 Fuel-Dispensing Areas.

28.1.2.1.1.32(A)
Portable fire extinguishers that meet the minimum requirements of Chapter 5 of NFPA 10 for extra (high) hazard type shall be installed on two sides of a fuel-dispensing area. [303:6.1.1.1.32.1]

28.1.2.1.1.32(B)
On piers or bulkheads where long fueling hoses are installed for fueling vessels, additional extinguishers installed on piers or bulkheads shall meet the requirements of Chapter 5 of NFPA 10 for extra (high) hazard type and 28.1.2.1.1.1 of this Code. [303:6.1.1.1.32.2]

28.1.2.1.1.3 [Moved to 28.1.2.1.1.2]
All extinguishers installed on piers shall meet the rating requirements set forth in Chapter 5 of NFPA 10 for ordinary (moderate) hazard type. [303:6.1.1.1.3]
28.1.2.1.2 Visibility and Identification.

All portable fire extinguishers shall be clearly visible and marked. [303:6.12.2]

28.1.2.2.1 Buildings on Piers and Covered Piers.

28.1.2.2.1.1

Buildings in excess of 500 ft² (46 m²) that are constructed on piers and covered piers in excess of 5000 ft² (460 m²) shall be protected by an approved automatic fire-extinguishing system unless otherwise permitted by 28.1.2.2.1.2 or 28.1.2.2.1.3. [303:6.2.1.1]

28.1.2.2.1.2

Buildings of Type I or Type II construction, as specified in NFPA 220 and without combustible contents, shall not be required to be protected by an automatic fire-extinguishing system. [303:6.2.1.2]

A.28.1.2.2.2

See A.28.1.2.1.3. [303:A.6.32.2.2]

A.28.1.2.2.3.4

See A.28.1.2.1.3. [303:A.6.23.3.4]

A.28.1.2.2.4.1

Compliance with the requirements of Chapter 172 of NFPA 13 for the protection of Group A plastics stored on solid shelves should be considered for the design and installation of automatic sprinkler systems provided for the protection of buildings housing boats stored on multilevel racks. The combustibility of the boats in storage should be considered in determining hazard classifications. Plan view configuration of the boats in storage should be reviewed to determine whether in-rack sprinklers are needed and to aid in the proper design of the in-rack portion of the sprinkler system. Sound engineering judgment is necessary in selecting sprinkler spacing, placement, and design criteria. [303:A.6.2.4.1]

28.1.2.2.4.2

An automatic fire-extinguishing system shall not be required for buildings less than 5000 ft² (465 m²) having multilevel racks where provided with one of the following:

1. An automatic fire detection and alarm system supervised by a central station complying with NFPA 72
2. An automatic fire detection and alarm system supervised by a local protective signaling system complying with NFPA 72, if the provisions of 28.1.2.2.4.2(1) are not technically feasible
3. A full-time watch service if the provisions of 28.1.2.2.4.2(1) are not technically feasible

[303:6.2.4.2]
A.28.1.2.3
The 2019 edition of NFPA 14 has incorporated a chapter specific to standpipes and hose systems installed at marinas, boatyards, and marine terminals or on piers, docks, and wharves. This chapter addresses the unique concerns of these systems, including corrosion resistance, flexibility, and other issues specific to the maritime environment. Where standpipe system components are installed in areas subjecting these components to corrosion or other atmospheric damage, special considerations might be necessary. Corrosion-resistant types of pipe, fittings, and hangers or protective corrosion-resistant coatings should be used where corrosive conditions exist. [303:A.6.43]

28.1.2.3.2
Class I standpipes shall be provided in all buildings used for the rack storage of boats. [303:6.43.2]

28.1.2.3.3
Standpipe systems, where installed, shall be in accordance with NFPA 14, except for the provisions identified in 28.1.2.3.4 through 28.1.2.3.7. [303:6.3.3]

28.1.2.3.5
Supply piping for standpipes on piers and bulkheads shall be sized for the minimum flow rate of 300 gpm (1136 L/min). [303:6.3.5]

28.1.2.3.6
Manual dry standpipes shall be permitted. [303:6.3.6]

28.1.2.3.7
Flexible connections shall be permitted on floating piers where acceptable to the AHJ. [303:6.3.7]

28.1.2.4 In-Out Dry Storage and Rack Storage.
Water supply and hoses or portable fire extinguishers and wheeled cart assemblies equipped with discharge nozzles capable of reaching all boats on the highest racks shall be provided. [303:6.4]

28.1.2.4.1
Fire protection shall be provided as described in either 28.1.2.4.1.1 or 28.1.2.4.1.2. [303:6.4.1]

28.1.2.4.1.1
A Class II standpipe system shall be designed and installed in accordance with NFPA 14. [303:6.4.1.1]

28.1.2.4.1.2 *
Portable fire extinguishers shall be provided in accordance with NFPA 10. [303:6.4.1.2]
A.28.1.2.4.1.2
A portable fire extinguisher can be either hand carried or on wheels. [303:A.6.4.1.2]

28.1.2.4.2
The fire protection provided in 28.1.2.4.1 shall be capable of reaching all boats, including those on the highest rack. [303:6.4.2]

28.1.2.5 Hydrants and Water Supplies.
Hydrants and water supplies for fire protection in marinas and boatyards shall be provided in accordance with this Code, NFPA 13, NFPA 14, and NFPA 24. [303:6.5]

28.1.2.6* Exposure Protection.
The hazards of fire exposure and appropriate protection methods shall be evaluated. [303:6.7]

A.28.1.2.6
See NFPA 80A. [303:A.6.7]

28.1.2.7 Transmittal of Fire Emergency.

28.1.2.7.1
All marinas and boatyards shall have a means to notify the fire department rapidly in the event of an emergency. [303:6.8.1]

28.1.2.7.2
If a telephone is used to meet 28.1.2.8.1, the telephone installation shall meet the following criteria:

1. The telephone shall be available for use at all times.
2. Use of the telephone for emergency notification shall not require the use of a card, coin, or currency.
3. *The street address of the facility and the emergency telephone number(s) shall be displayed prominently on a sign at the telephone. [303:6.8.2]

A.28.1.2.7.2(3)
EMS and police numbers should be displayed in addition to fire department numbers unless 9-1-1 (E-9-1-1) is in use.

28.1.2.6 28.1.2.8 Automatic Fire Detectors.

28.1.2.6.128.1.2.8.1
Automatic Fire detection devices and installation shall be in accordance with NFPA 72. [303:6.9.1]
28.1.2.6.2

**Automatic Fire detectors** shall be installed in the following interior or covered locations unless those locations are protected by a fixed automatic sprinkler system installed in accordance with NFPA 13:

1. Rooms containing combustible storage or goods
2. Rooms containing flammable liquid storage or use
3. Rooms containing battery storage or maintenance
4. Rooms containing paint and solvent storage or use
5. Areas used for enclosed or covered storage of vessels
6. Areas used for enclosed or covered maintenance of vessels
7. Areas used for public assembly, dining, or lodging
8. Kitchens and food preparation areas
9. Dust bins and collectors
10. Inside trash storage areas
11. Rooms used for storing janitor supplies or linens
12. Laundry rooms
13. Furnace rooms

[303:6.9.2]

28.1.3.2.1.2

Ladders long enough to reach the deck of any stored boat shall be provided and readily accessible. [303:7.2.1.2]

28.1.3.2.3.1

Where boats are stored either inside or outside in single- or multiple-level racks, those boats shall have unimpeded vehicular access at one end, and equipment shall be available to remove any stored boat. [303:7.2.3.1]

28.1.3.2.3.5

The charging of batteries shall be prohibited in the in-out dry storage building. [303:7.2.3.5]

28.1.4.1.1

The management shall have an inspection made of each boat received for major repair or storage as soon as practicable after arrival of the boat and before commencement of any work aboard. [303:8.1.1]

28.1.4.1.2

The inspection required in 28.1.4.1.1 shall include the following determinations:

1. Presence of combustible or flammable vapors in any compartment
2. General maintenance and cleanliness, and location of any combustible or flammable materials that require removal or protection for the safe accomplishment of the particular work involved
3. Quantity, type, and apparent condition of fire-extinguishing equipment onboard
4. Listed and appropriate shore power inlet(s) and ship-to-shore cable(s), when present
28.1.4.2.6

The marina or boatyard operator shall post in a prominent location, or provide to boat operators using a marina or boatyard for mooring, repair, servicing, or storage, a list of safe operating procedures containing at least the following information:

1. A prohibition against the use of any form of hibachis, charcoal, wood, or gas-type portable cooking equipment, except in specifically authorized areas that are not on the docks, on boats in the berthing area, or near flammables
2. Procedures for disposal of trash
3. Designation of nonsmoking areas
4. Location of fire extinguishers and hoses
5. Procedures for turning in a fire alarm
6. Fueling procedures
7. Emergency contact information and marina address for notifying emergency services to respond to an incident

A.28.1.4.2.6(6)

See 42.9.10.8 for the list of the fuel dispensing requirements that are to be provided to boat operators using the marina or boatyard. [303:A.8.2.6]

F.3 References for Extracts in Informational Sections.

MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1493 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA \textbf{HAS} achieved the \(\frac{3}{4}\) majority vote needed on both Ballot Item No. 1 (\textbf{Technical Merit}) and Ballot Item No. 2 (\textbf{Emergency Nature}).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

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There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of \(\frac{3}{4}\) of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible} \div 2 = 15 + 1 = (16)\]

(2) The number of affirmative votes needed to satisfy the \(\frac{3}{4}\) requirement is \textbf{16}.

\((30 \text{ eligible to vote} - 9 \text{ not returned} - 0 \text{ abstentions} = 21 \times 0.75 = 15.75)\)

Ballot comments are attached for your review.

The \textit{Regs} at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

\textbf{Appeal Closing Date} for this TIA is \textbf{June 23, 2020}. 

Attachment 20-8-16-b
Page 1 of 4
### QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1493 on various 303 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

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<tr>
<td>James S. Peterkin</td>
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<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
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<tr>
<td>Peter J. Willse</td>
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<tr>
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<tr>
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<td></td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td>Agree</td>
<td>The clear use and availability of extinguishers is important</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Scott T. Laramee</td>
<td>Agree</td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
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### QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

<table>
<thead>
<tr>
<th>Eligible to Vote: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Returned: 9</td>
</tr>
<tr>
<td>Vote Selection</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Agree</td>
</tr>
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<td>Kelly T. Nicolello</td>
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<td>Raymond C. O'Brocki</td>
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Kenneth Earl Tyree, Jr. A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen B.
Scott T. Laramee I agree

Disagree 0
Abstain 0
**SEE ATTACHED FOR REVISIONS**

**Substantiation:** The current text of NFPA 1 contains extracts from the last published edition of NFPA 307 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 307 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
2.4 References for Extracts in Mandatory Sections.

3.3.1852 Marine Terminal.
A facility comprised of one or more berths, piers, wharves, loading and unloading areas, warehouses, and storage yards and used for transfer of people and/or cargo between waterborne and land transportation modes. [307, 2021]

3.3.2196 *Pier.
A structure, usually of greater length than width and projecting from the shore into a body of water with direct access from land, that can be either open deck or provided with a superstructure. [307, 2021]

A.3.3.2196 Pier.
The terms pier and wharf are used interchangeably. [307, 2021]

3.3.302297 *Wharf.
A structure at the shoreline that has a platform built along and parallel to a body of water with either an open deck or a superstructure. [307, 2021]

A.3.3.302297 Wharf.
The terms wharf and pier are used interchangeably. [307, 2021]

F.3 References for Extracts in Informational Sections.
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1494 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

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<thead>
<tr>
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<tr>
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<td>0 Abstentions</td>
</tr>
<tr>
<td>21 Agree (w/comment: Hanselka, Peterkin)</td>
<td>21 Agree (w/comment, Clary, Peterkin)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

1. In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

   \[30 \text{ eligible} \div 2 = 15 + 1 = (16)\]

2. The number of affirmative votes needed to satisfy the ¾ requirement is **16**.
   
   \((30 \text{ eligible to vote} - 9 \text{ not returned} - 0 \text{ abstentions} = 21 \times 0.75 = 15.75)\)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
## NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
## PROPOSED TIA NO. 1494 BALLOT - FINAL RESULTS

### QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1494 on various 307 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

<table>
<thead>
<tr>
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<th>Votes</th>
<th>Comments</th>
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<tbody>
<tr>
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<td>21</td>
<td></td>
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<tr>
<td>James S. Peterkin</td>
<td></td>
<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td>Agree</td>
<td></td>
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<tr>
<td>Anthony C. Apfelbeck</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>I agree that the extract should be updated.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>John A. Sharry</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>This will make it more user friendly</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Wade Palazini</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Scott T. Laramee</td>
<td></td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
<td>Terin Hopkins</td>
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<td></td>
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<tr>
<td>Kelly T. Nicolello</td>
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<td>Raymond C. O’Brocki</td>
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<td>Cesar Lujan</td>
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<td></td>
</tr>
<tr>
<td>Brian L. Olsen</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

### QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

| Vote Selection | Votes | |
|----------------|-------||
| Eligible to Vote: 30 | Not Returned: 9 |
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, H. Butch Browning, Jr., Marvin Dwayne Garriss

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<td></td>
<td>These extracted text changes should be included with this upcoming edition.</td>
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<td>Peter J. Willse</td>
<td></td>
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<tr>
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<td></td>
<td>The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td>A, B, C and D</td>
<td></td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td>B</td>
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<td>Carl F. Baldassarra</td>
<td>A</td>
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<tr>
<td>Scott M. Bryant</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Sarina L. Hart</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>John A. Sharry</td>
<td>A &amp; B</td>
<td></td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td>Reason F</td>
<td></td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td>A and B</td>
<td></td>
</tr>
<tr>
<td>Wade Palazini</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td>F</td>
<td>The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td>Agree</td>
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Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen

B.

Scott T. Laramee

I agree

Disagree

0

Abstain

0
SEE ATTACHED FOR REVISIONS

Substantiation: The current text of NFPA 1 contains extracts from the last published edition of NFPA 312 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 312 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

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2.4 References for Extracts in Mandatory Sections.


F.3 References for Extracts in Informational Sections.

MEMORANDUM

TO: Technical Committee on Fire Code
FROM: Kelly Carey, Technical Committee Administrator
DATE: June 18, 2020
SUBJECT: NFPA 1 Proposed TIA No. 1495 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

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(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible } ÷ 2 = 15 + 1 = (16)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 16.

(30 eligible to vote - 9 not returned - 0 abstentions = 21 × 0.75 = 15.75)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

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<tr>
<td>Peter J. Willese</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1495 on various 312 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
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<td>Robert J. Davidson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>Extracts necessary for Marine Safety</td>
</tr>
<tr>
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<td></td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
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Eligible to Vote: 30
Not Returned : 9
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, H. Butch Browning, Jr., Marvin Dwayne Garriss

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Shane M. Clary
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Catherine L. Stashak
A

Anthony C. Apfelbeck
A, B, C and D

Richard Jay Roberts
B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard."

Carl F. Baldassarra
A. The standard contains an error or an omission that was overlooked during the regular revision process.

Kenneth E. Bush
The standard contains an error or an omission that was overlooked during the regular revision process.

Scott M. Bryant
B

Sarina L. Hart
A

John A. Sharry
A & B

Wade Palazini
E

Robert J. Davidson
A and B

Reinhard Hanselka
Safety has high priority ,

Terin Hopkins
F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Kelly T. Nicolello
Agree

Raymond C. O’Brocki
The standard contains an error or an omission that was overlooked during the regular revision process.
A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen

Scott T. Laramee

I agree

Disagree 0

Abstain 0
SEE ATTACHED FOR REVISIONS

Substantiation: The current text of NFPA 1 contains extracts from the last published edition of NFPA 96 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 96 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
2.3.18 UL Publications.


2.3.21 U.S. Government Publications.


2.4 References for Extracts in Mandatory Sections.


10.15.1.2
Section 10.15 shall not apply to portable and vehicle-mounted generators used solely for mobile and temporary cooking operations. (See Section 50.8.)

10.15.1.3
Section 10.15 shall not apply to stationary generators. (See Section 11.7.)

50.1.3
Cooking equipment used in fixed, mobile, or temporary concessions, such as trucks, buses, trailers, pavilions, tents, or any form of roofed enclosure, shall comply with this standard. [96:1.1.3]

A.50.1.3
The authority having jurisdiction (AHJ) can exempt temporary facilities, such as a tent, upon evaluation for compliance to the applicable portions of this standard. [96:A.1.1.3]

Although it might not be practical to enforce all requirements of this standard in temporary facilities, the authority having jurisdiction (AHJ) should determine that all necessary provisions that affect the personal safety of the occupants are considered. [96:A.1.1.3]

50.1.43
This chapter shall not apply to cooking equipment located in a single dwelling unit. [96:1.1.43]

50.1.54 *
This chapter shall not apply to facilities where all of the following are met:
Only residential equipment is being used.

Fire extinguishers are located in all kitchen areas in accordance with Section 13.6.

The facility is not an assembly occupancy.

The AHJ has approved the installation.

A.50.1.54

This judgment should take into account the type of cooking being performed, the items being cooked, and the frequency of cooking operations. Examples of operations that might not require compliance with Chapter 50 include the following:

1. Day care centers warming bottles and lunches
2. Therapy cooking facilities in health care occupancies
3. Churches and meeting operations that are not cooking meals that produce grease-laden vapors
4. Employee break rooms where food is warmed

In non-assembly occupancies where residential equipment is utilized, the AHJ may consider requiring protection of the cooking surface with a listed residential range top extinguishing unit as an alternative to no protection or requiring full protection in accordance with this standard.

50.2 General Requirements for Cooking Operations in Buildings and Mobile and Temporary Cooking Operations

50.2.1.1.1 *

Cooking equipment that has been listed in accordance with UL 197, Commercial Electric Cooking Appliances, or an equivalent standard for reduced emissions shall not be required to be provided with an exhaust system. [96:4.1.1.1]

50.2.1.1.2

The listing evaluation of cooking equipment covered by 50.2.1.1.1 shall demonstrate that the grease discharge at the exhaust duct of a test hood placed over the appliance shall not exceed 0.00018 oz/ft³ (5 mg/m³) when operated with a total airflow of 500 cfm (0.236 m³/sec). [96:4.1.1.2]

50.2.1.3

The following equipment shall be kept in working condition:

1. Cooking equipment
2. Hoods
3. Ducts (if applicable)
4. Fans
5. Fire-extinguishing equipment
6. Special effluent or energy control equipment
50.2.1.6
All solid fuel cooking equipment shall comply with the requirements of Chapter 15 of NFPA 96.

A.50.2.1.6
When solid fuel is burned in cooking operations, increased quantities of carbon, creosote, and grease-laden vapors are produced that rapidly contaminate surfaces, produce airborne sparks and embers, and are subject to significant flare-ups. Also, solid fuel cooking requires fuel storage and handling and produces ash that requires disposal. For these reasons, solid fuel cooking operations are required to comply with Chapter 145 of NFPA 96.

50.2.1.7
Multi-tenant applications shall require the concerted cooperation of design, installation, operation, and maintenance responsibilities by tenants and by the building owner.

50.2.2 Clearance.

50.2.2.1 Where enclosures are not required, hoods, grease removal devices, exhaust fans, and ducts shall have a clearance of at least 18 in. (457 mm) to combustible material, 3 in. (76 mm) to limited-combustible material, and 0 in. (0 mm) to noncombustible material.

50.2.2.2 Where a hood, duct, or grease removal device is listed for clearances less than those required in 50.2.2.1, the listing requirements shall be permitted.

50.2.3 Drawings.

50.2.3.1 Where inspections are required, notice shall be given to the AHJ authority having jurisdiction on completion of the installation, or as otherwise directed.

50.2.3.2 A drawing(s) of the exhaust system installation along with copies of operating instructions for subassemblies and components used in the exhaust system, including electrical schematics, shall be kept on the premises and made available on request to the AHJ and maintenance persons.

50.4 Fire-Extinguishing Equipment for Cooking Operations in Buildings
Extinguishing Equipment.

50.4.4.3 *
Automatic fire-extinguishing systems shall comply with UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas*, or other equivalent standards and shall be installed in accordance with the requirements of the listing. [96:10.2.3]

A.50.4.4.3
UL 300 primarily addresses the method of fire testing for self-contained chemical extinguishing systems commonly referred to as pre-engineered systems. UL 300 has been identified as a baseline for testing fire-extinguishing systems intended for the protection of commercial cooking–related hazards. Additional equivalent testing standards can and have been written for other types of fire-extinguishing systems not considered pre-engineered that demonstrate equivalent fire testing severity to the UL 300 test standard include: Current examples include, but are not limited to, UL 199, UL Subject 199B, UL Subject 199E, and UL 710B. [96:A.10.2.3]

A.50.4.4.3.1
A change from rendered animal fat to cooking oil likely will increase auto-ignition temperatures, and a change to insulated energy-efficient cooking equipment that does not allow ease of cooling likely will result in difficulties sustaining extinguishment with systems not complying with UL 300, UL 199, UL 199B, UL 199E, or UL 710B or equivalent standards. [96:A.10.2.3.1]

50.4.4
Grease removal devices, hood exhaust plenums, exhaust ducts, and cooking equipment that are not addressed in UL 300 or other equivalent test standards shall be protected with an automatic fire-extinguishing system(s) in accordance with the applicable NFPA standard(s), all local building and fire codes, and the fire-extinguishing system’s manufacturer’s recommendations and shall be approved by the AHJ. [96:10.2.4]

50.4.5
Automatic fire-extinguishing equipment provided as part of listed recirculating systems shall comply with UL 710B, *Outline of Investigation for Recirculating Exhaust System*. [96:10.2.5]

50.4.8.5
Where a separate fire-extinguishing system is used for protection of cooking equipment only, a water-wash fire-extinguishing system listed for protection of the grease removal device(s), hood exhaust plenum(s), exhaust duct(s), or combination thereof shall be provided with instructions and appropriate means for electrical interface for simultaneous activation. [96:10.2.8.5]

50.4.8.6
A water-wash system approved to be used for protection of the grease removal device(s), hood exhaust plenum(s), exhaust duct(s), or combination thereof shall include instructions and appropriate electrical
interface for simultaneous activation actuation of the water-wash system from an automatic fire-extinguishing system, where the automatic fire-extinguishing system is used for cooking equipment protection only. [96:10.2.8.6]

50.4.4.8.7
Where the automatic fire-extinguishing system in accordance with NFPA 17A provides protection for the hood and duct in a fixed baffle hood containing a water-wash system, the water-wash system shall be made inoperable or delayed for a minimum of 60 seconds upon operation of the automatic fire-extinguishing system. [96:10.2.8.7]

50.4.5.1.1
Hoods installed end to end, back to back, or both, or sharing a common ductwork, not exceeding 75 ft (22.9 m) (75 ft) in distance from the farthest hood, and having a grease-producing appliance(s) located under one or more of the hoods, shall be considered a single hazard area requiring simultaneous automatic fire protection in all hoods and ducts. [96:10.3.1.1]

50.4.5.1.1.1
In hoods that are installed end to end, back to back, or both, and that share a common ductwork, the ductwork beyond 75 ft (22.9 m) (75 ft) from the farthest hood shall be protected by an independent fire-extinguishing system with its own detection system or by a fire-extinguishing system that activates simultaneously with the fire-extinguishing system(s) protecting the hoods. [96:10.3.1.1.1]

50.4.6.1
Upon activation actuation of any fire-extinguishing system for a cooking operation, all sources of fuel and electric power that produce heat to all equipment requiring protection shall automatically shut off. [9617A:10.4.14.4.1]

50.4.6.3
Any gas appliances not requiring protection but located under the same ventilation equipment where protected appliances are located shall also be automatically shut off upon activation actuation of the extinguishing system. [9617A:10.4.34.4.4.2]

50.4.6.4
Shutoff devices shall require manual resetting prior to fuel or power being restored. [96:10.4.4]

50.4.7 Manual Activation

50.4.7.1.1
At least one manual actuation device shall be located in a means of egress or at a location acceptable to the AHJ. [96:10.5.1.1]

50.4.7.1.2
The manual actuation device shall clearly identify the hazard protected and be provided with instructions for its use. [96:10.5.1.2]

50.4.7.1.3*
Manual actuation devices installed in locations where accidental operation could occur shall be provided with a guard where required by the AHJ. [96:10.5.1.3]

A.50.4.7.1.3
Installing a guard should reduce the likelihood of an unwanted discharge of the fire-extinguishing system. [96:A.10.5.1.3]

50.4.7.3
Instruction regarding the proper use of portable fire extinguishers and the manual activation of fire-extinguishing equipment shall be documented and shall be provided by the management to new employees on hiring and to all employees annually. [96:10.5.3]

50.4.8 System Annunciation.

50.4.8.1
Upon activation of an automatic fire-extinguishing system, an audible alarm or visual indicator shall be provided to show that the system has activated. [96:10.6.1]

50.4.8.2
Where a fire alarm signaling system is serving the occupancy where the extinguishing system is located, the activation of the automatic fire-extinguishing system shall activate the fire alarm signaling system in accordance with the requirements of NFPA 72. [96:10.6.2]

50.4.9.2
A single listed detection device, listed with the extinguishing system, shall be permitted for more than one appliance where installed in accordance with the terms of the system’s listing. [96:10.7.25.6.1.5.4]

A.50.4.10.2
Although training and qualification might be available elsewhere, the manufacturer of the equipment being installed should be considered an appropriate source of training and qualification. [96:A.10.89.2]

A.50.4.11.1
The system used to rate extinguishers for Class B fires (flammable liquids in depth) does not take into consideration the special nature of heated grease fires. Cooking-grease fires are a special hazard requiring agents that saponify (make a soap foam layer to seal the top surface of the grease) for this application. [96:A.10.940.1]
50.4.11.4
Carbon dioxide–type extinguishers shall not be permitted. [96:10.9.4]

50.5 Fire-Extinguishing Equipment for Mobile and Temporary Cooking Operations.

50.5.1 General Requirements.

50.5.1.1
Fire-extinguishing equipment for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems shall be provided. [96:11.1.1]

50.5.1.2*
Cooking equipment that produces grease-laden vapors shall be protected by a fire-extinguishing system for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems. [96:11.1.2]

A.50.5.1.2
Examples of cooking equipment that produce grease-laden vapors include, but are not limited to, deep fat fryers, ranges, griddles, broilers, woks, tilting skillets, and braising pans. [96:A.11.1.2]

50.5.2 Types of Equipment.

50.5.2.1*
A placard shall be conspicuously placed near each Class K extinguisher that states that the fire protection system shall be activated prior to using the fire extinguisher. [96:11.2.1]

A.50.5.2.1
NFPA 10, Annex A, provides recommendations for placards. [96:A.11.2.1]

50.5.2.1.1
The language and wording for the placard shall be approved by the AHJ. [96:11.2.1.1]

50.5.2.2*
Automatic fire-extinguishing systems shall comply with UL 300 or other equivalent standards and shall be installed in accordance with the terms of their listing and NFPA 17A. [96:11.2.2]

A.50.5.2.2
UL 300 primarily addresses the method of fire testing for self-contained chemical extinguishing systems commonly referred to as pre-engineered systems. UL 300 has been identified as a baseline for testing fire-extinguishing systems intended for the protection of commercial cooking–related hazards. Additional equivalent testing standards for other types of fire-extinguishing systems not considered pre-
engineered that demonstrate equivalent fire testing severity to the UL 300 test standard include UL 199, UL 199B, UL 199E, and UL 710B. [96:A.11.2.2]

50.5.2.3 Modifications to Existing Hood Systems.

50.5.2.3.1
Any abandoned pipe or conduit from a previous installation shall be removed from within the hood, plenum, and exhaust duct. [96:11.2.3.1]

50.5.2.3.2
Penetrations and holes resulting from the removal of conduit or piping shall be sealed with listed or equivalent liquidtight sealing devices. [96:11.2.3.2]

50.5.2.3.3
The addition of obstructions to spray patterns from the cooking appliance nozzle(s) such as baffle plates, shelves, or any modification shall not be permitted. [96:11.2.3.3]

50.5.2.3.4
Changes or modifications to the hazard after installation of the fire-extinguishing systems shall result in re-evaluation of the system design by a properly trained, qualified, and certified person(s). [96:11.2.3.4]

50.5.3 Fuel and Electric Power Shutoff.

50.5.3.1
Upon actuation of any fire-extinguishing system for a cooking operation, all sources of fuel and electric power that produce heat to all equipment protected by the system shall automatically shut off. [17A:4.4.4.1]

50.5.3.2
Gas appliances not requiring protection but located under the same ventilation equipment where protected appliances are located shall also be automatically shut off upon actuation of the extinguishing system. [17A:4.4.4.2]

50.5.3.3
Shutoff devices shall require manual resetting prior to fuel or power being restored. [96:11.3.3]

50.5.3.3.1
Where an electrical gas valve is used for shutting off gas to appliances, a manually reset relay shall be used to restore electrical power to the gas valve. [96:11.3.3.1]

50.5.4 Manual Actuation.

50.5.4.1
All systems shall have both automatic and manual methods of actuation. [96:11.4.1]

50.5.4.1.1*
At least one manual actuation device shall be located in a means of egress or at a location acceptable to the AHJ. [96:11.4.1.1]

A.50.5.4.1.1
Mounting location is recommended to be a minimum of 10 ft (3 m) and a maximum of 20 ft (6 m) from the protected hood. [96:A.11.4.1.1]

50.5.4.1.2
The manual actuation device shall clearly identify the hazard protected and be provided with instructions for its use. [96:11.4.1.2]

50.5.4.1.3*
Manual actuation devices installed in locations where accidental operation could occur shall be provided with a guard where required by the AHJ. [96:11.4.1.3]

A.50.5.4.1.3
Installing a guard should reduce the likelihood of an unwanted discharge of the fire-extinguishing system. [96:A.11.4.1.3]

50.5.4.2
An automatic sprinkler system shall not require a method of manual actuation. [96:11.4.2]

50.5.5 System Annunciation.

50.5.5.1
Upon actuation of an automatic fire-extinguishing system, an audible alarm or visual indicator shall be provided to show that the system has actuated. [96:11.5.1]

50.5.5.2
At least one listed audible and visual notification appliance shall be installed on the exterior surface of the vehicle readily audible and visible to the public. [96:11.5.2]

50.5.6 Review and Certification.

50.5.6.1
Where required, complete drawings of the system installation, including the hood(s), exhaust duct(s), and appliances, along with the interface of the fire-extinguishing system detectors, piping, nozzles, fuel and electric power shutoff devices, agent storage container(s), and manual actuation device(s), shall be submitted to the AHJ and located within the mobile cooking operation. [96:11.6.1]
50.5.6.2 Installation Requirements.

A.50.5.6.2
Although training and qualification might be available elsewhere, the manufacturer of the equipment being installed should be considered an appropriate source of training and qualification. [96:11.6.2]

50.5.6.2.1
Installation of systems shall be performed only by persons properly trained and qualified to install the specific system being provided. [96:11.6.2.1]

50.5.6.2.2
The installer shall provide certification to the AHJ that the installation is in agreement with the terms of the listing and the manufacturer’s instructions and/or approved design. [96:11.6.2.2]

50.7.1.450.5.7 Portable Fire Extinguishers.

50.7.1.4.1 50.5.7.1*
Portable fire extinguishers shall be selected and installed in kitchen cooking areas in accordance with Section 13.6 and shall be specifically listed for such use provided per NFPA 96 for cooking operations. [96:11.7.1]

A.50.5.7.1
The system used to rate extinguishers for Class B fires (flammable liquids in depth) does not take into consideration the special nature of heated grease fires. Cooking-grease fires are a special hazard requiring agents that saponify (i.e., make a soap foam layer to seal the top surface of the grease) for this application. [96:A.11.7.1]

50.5.7.2
Class K fire extinguishers shall be provided for cooking appliance hazards that involve combustible cooking media (vegetable oils and animal oils and fats). [96:11.7.2]

50.7.1.4.3 50.5.7.3
When wood or charcoal is used, a minimum of one 2A extinguisher or an approved hose line shall be provided for solid fuel cooking operations in accordance with Section 13.6. [96:11.7.3]

50.5.7.4
Portable fire extinguishers shall be provided for other hazards in kitchen areas and shall be selected and installed in accordance with Section 13.6. [96:11.7.4]

50.7.1.4.250.5.7.5
Where internal combustion engine power sources are provided, at least one portable fire extinguisher rated 2A:10 BC portable fire extinguisher shall be provided when a generator or other fuel fired appliance is used. [96:11.7.5]

50.5.7.6
Carbon dioxide–type extinguishers shall not be permitted. [96:11.7.6]

50.5.7.7
Portable fire extinguishers shall be maintained in accordance with Section 13.6. [96:11.7.7]

50.5.6 Procedures for the Use, Inspection, Testing, and Maintenance of Equipment.

50.5.1.50.6.1 Operating Procedures.

50.5.1.1 50.6.1.1
Exhaust systems shall be operated whenever cooking equipment is turned on. [96:142.1.1]

50.5.1.2 50.6.1.2
Filter-equipped exhaust systems shall not be operated with filters removed. [96:142.1.2]

50.5.1.3 50.6.1.3
Openings provided for replacing air exhausted through ventilating equipment shall not be restricted by covers, dampers, or any other means that would reduce the operating efficiency of the exhaust system. [96:142.1.3]

50.5.1.4 50.6.1.4 *
Instructions shall be provided to new employees on hiring and to all employees semiannually on the use of portable fire extinguishers and the manual actuation of the fire-extinguishing system. [96:142.1.4]

A.50.5.1.4A 50.6.1.4
It is important that all kitchen employees be instructed that the fire-extinguishing system is the primary protection and how to respond appropriately to a fire. If the fire cannot be extinguished by shutting off the fuel source to a pan of burning grease and covering the pan, then employees should perform the following:

1. Operate the manual actuation device for the fire-extinguishing system to suppress the fire and automatically shut off fuel to the appliances.
2. Call the fire department and report the fire.
3. Evacuate personnel and guests, as needed.
4. Stand by with a Class K fire extinguisher to be used if the fire is not fully extinguished by the fire-extinguishing system.

[96:A.142.1.4]
50.5.1.4.1 Responsibility for compliance with 50.56.1.4 shall be that of management of the commercial cooking operation. [96:142.1.4.1]

50.5.1.4.2 Records of compliance with 11.1.4 shall be maintained and shall be available to the AHJ authority having jurisdiction. [96:142.1.4.2]

50.5.1.4.3 Instructions for manually operating the fire-extinguishing system shall be posted conspicuously in the kitchen and shall be reviewed with employees by the management. [96:142.1.4.3]

50.5.1.5 Listed exhaust hoods shall be operated in accordance with the terms of their listings and the manufacturer's instructions. [96:142.1.5]

50.5.1.6 Cooking equipment shall not be operated while its fire-extinguishing system or exhaust system is nonoperational or impaired. [96:142.1.6]

50.5.1.6.1 Where the fire-extinguishing system or exhaust system is nonoperational or impaired, the systems shall be tagged as noncompliant, and the system owner or the owner's representative shall be notified in writing of the impairment, and, where required, the AHJ shall be notified. [96:142.1.6.1]

50.5.1.7 Secondary filtration and pollution control equipment shall be operated in accordance with the terms of its listing and the manufacturer's recommendations. [96:142.1.7]

50.6.1.7.1 The requirement of 50.6.1.7 shall not apply to mobile and temporary cooking operations. [96:142.1.7.1]

50.5.1.8.5 Inspection and maintenance of “other equipment” as allowed in 9.3.1 of NFPA 96 shall be conducted by properly trained and qualified persons at a frequency determined by the manufacturer's instructions or the equipment listing. [96:142.1.8]

50.5.2.150.6.2 Inspection, Testing, and Maintenance of Fire-Extinguishing Systems.
An activated water system that is listed to extinguish a fire in the grease removal devices, hood exhaust plenums, and exhaust ducts shall be made by properly trained, qualified, and certified person(s) acceptable to the AHJ at least every 6 months. [96:12.2.1]

A.50.5.2.1A.50.6.2.1
It is recommended that such training and qualification be performed by the manufacturer of the equipment being inspected and serviced. The various electrical, mechanical, and filtration components of the systems should be inspected and tested as required to ensure that they continue to function according to original design. [96:A.12.2.1]

50.6.2.1.1
The requirement of 50.6.2.1 shall not apply to mobile and temporary cooking operations. [96:12.2.1.1]

50.5.2.250.6.2.2 *
All actuation and control components, including remote manual pull stations, mechanical or electrical devices, detectors, and actuators, shall be tested for proper operation during the inspection in accordance with the manufacturer’s procedures. [96:12.2.2]

A.50.5.2.2A.50.6.2.2
It is not intended that actual discharge of agent occur to test all components, but where pressure from the discharging agent or from compressed gas actuators is needed to activate control components, an alternate means for testing those components should be provided and used. [96:A.12.2.2]

50.5.2.350.6.2.3
The specific inspection and maintenance requirements of the extinguishing system standards as well as the applicable installation and maintenance manuals for the listed system and service bulletins shall be followed. [96:12.2.3]

50.5.2.450.6.2.4 *
Fusible links of the metal alloy type and automatic sprinklers of the metal alloy type shall be replaced at least semiannually. [96:12.2.4]

A.50.5.2.4A.50.6.2.4
The date of manufacture marked on fusible metal alloy sensing elements does not limit when they can be used. These devices have unlimited shelf life. The intent of 50.65.2.4 is to require semiannual replacement of fusible metal alloy sensing elements that have been installed in environments that subject them to contaminant loading, such as grease in restaurant hoods and ducts, that could adversely affect their proper operation. [96:A.12.2.4]

50.5.2.550.6.2.5
The year of manufacture and the date of installation of the fusible links shall be marked on the system inspection tag. [96:12.2.5]
50.5.2.5.1
The tag shall be signed or initialed by the installer. [96:142.2.5.1]

50.5.2.5.2
The fusible links shall be destroyed when removed. [96:142.2.5.2]

50.5.2.6
Detection devices that are bulb-type automatic sprinklers and fusible links other than the metal alloy type shall be examined and cleaned or replaced annually. [96:142.2.6]

50.5.2.7
Fixed temperature-sensing elements other than the fusible metal alloy type shall be permitted to remain continuously in service, provided they are inspected and cleaned or replaced if necessary in accordance with the manufacturer's instructions, every 12 months or more frequently to ensure proper operation of the system. [96:142.2.7]

50.5.2.8
Where required, certificates of inspection and maintenance shall be forwarded to the AHJ. [96:142.2.8]

50.5.3.1
The requirements in 50.6.3 shall not apply to mobile and temporary cooking operations. [96:142.3.1]

50.5.3.2
Actuation components for fire dampers shall be inspected for proper operation in accordance with the manufacturer's listed procedures. [96:142.3.2]

50.5.3.2.1
Fusible links on fire damper assemblies shall be replaced at least semiannually or more frequently as necessary. [96:142.3.2.1]

50.5.3.2.2
Replacement shall be made by a certified person acceptable to the AHJ. [96:142.3.2.2]
50.5.3.350.6.3.4 *Documentation Tag.

A.50.5.3.3A.50.6.3.4
See A.50.5.2.4A.50.6.2.4. [96:A.112.3.43]

50.5.3.350.6.3.4.1
The year of manufacture and the date of installation of the fusible links shall be documented. [96:112.3.43.1]

50.5.3.3.250.6.3.4.2
The tag shall be signed or initialed by the installer. [96:112.3.43.2]

50.5.450.6.4 *Inspection for Grease Buildup.
The entire exhaust system shall be inspected for grease buildup by a properly trained, qualified, and certified person(s) acceptable to the AHJ and in accordance with Table 50.5.450.6.4. [96:112.4]

Table 50.5.450.6.4 Schedule of Inspection for Grease Buildup

<table>
<thead>
<tr>
<th>Type or Volume of Cooking</th>
<th>Inspection Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems serving solid fuel cooking operations</td>
<td>Monthly</td>
</tr>
<tr>
<td>*Systems serving high-volume cooking operations</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Systems serving moderate-volume cooking operations</td>
<td>Semiannually</td>
</tr>
<tr>
<td>†Systems serving low-volume cooking operations</td>
<td>Annually</td>
</tr>
</tbody>
</table>
*High-volume cooking operations include 24-hour cooking, charbroiling, and wok cooking.
†Low-volume cooking operations include churches, day camps, seasonal businesses, and senior centers. [96:Table 112.4]

A.50.5.4A.50.6.4
The primary focus of an inspection for cleanliness is to establish whether the volume of grease buildup within the exhaust system warrants cleaning and to determine whether adequate access is available throughout the exhaust system to remove the grease buildup. [96:A.112.4]

ANSI/IKECA I10 provides guidance for inspection of the exhaust system. [96:A.12.4]

50.5.550.6.5 Inspection, Testing, and Maintenance of Listed Hoods Containing Mechanical, Water Spray, or Ultraviolet Devices.
Listed hoods containing mechanical or fire-actuated dampers, internal washing components, or other mechanically operated devices shall be inspected and tested by properly trained, qualified, and certified persons every 6 months or at frequencies recommended by the manufacturer in accordance with their listings. [96:112.5]

50.5.650.6.6 Cleaning of Exhaust Systems.
If, upon inspection, the exhaust system is found to be contaminated with deposits from grease-laden vapors, the contaminated portions of the exhaust system shall be cleaned by a properly trained, qualified, and certified person(s) acceptable to the AHJ. [96:112.6.1]

A measurement system of deposition shall be established to trigger a need to clean when the exhaust system is inspected at the frequencies in Table 50.56.4. [96:112.6.1.1]

Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned to remove combustible contaminants to a minimum of 0.002 in. (50 μm (0.002 in.). [96:112.6.1.1.1]

A grease depth gauge comb, as shown in Figure 50.5.6.1.1.2 shall be placed upon the surface to measure grease depth. [96:112.6.1.1.2]

Where a measured depth of 0.078 in. (2000 μm (0.078 in.) is observed, the surfaces shall be cleaned in accordance with 50.56.6.1. [96:112.6.1.3]

Where a measured depth of 0.125 in. (3175 μm (0.125 in.) is observed in a fan housing, the surfaces shall be cleaned in accordance with 50.56.6.1. [96:112.6.1.4]

Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned to remove combustible contaminants prior to surfaces becoming heavily contaminated with grease or oily sludge. [96:112.6.2]

At the start of the cleaning process, electrical switches that could be activated accidentally shall be locked out. [96:112.6.3]

Components of the fire suppression system shall not be rendered inoperable during the cleaning process. [96:112.6.4]

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Fire-extinguishing systems shall be permitted to be rendered inoperable during the cleaning process where serviced by properly trained and qualified persons. [96:14.6.5]

50.5.6.650.6.6.6
Flammable solvents or other flammable cleaning aids shall not be used. [96:112.6.6]

50.5.6.750.6.6.7
Cleaning chemicals shall not be applied on fusible links or other detection devices of the automatic extinguishing system. [96:112.6.7]

50.5.6.850.6.6.8
After the exhaust system is cleaned, it shall not be coated with powder or other substance. [96:112.6.8]

50.5.6.950.6.6.9
When cleaning procedures are completed, all access panels (doors) and cover plates shall be restored to their normal operational condition. [96:112.6.9]

50.5.6.1050.6.6.10
When an access panel is removed, a service company label or tag preprinted with the name of the company and giving the date of inspection or cleaning shall be affixed near the affected access panels. [96:112.6.10]

50.5.6.1150.6.6.11
Dampers and diffusers shall be positioned for proper airflow. [96:112.6.11]

50.5.6.1250.6.6.12
When cleaning procedures are completed, all electrical switches and system components shall be returned to an operable state. [96:112.6.12]

50.5.6.1350.6.6.13
When an exhaust system is inspected or cleaned, a certificate showing the name of the servicing company, the name of the person performing the work, and the date of inspection or cleaning shall be maintained on the premises. [96:112.6.13]

50.5.6.1450.6.6.14
After cleaning or inspection is completed, the exhaust cleaning company and the person performing the work at the location shall provide the owner of the system with a written report that also specifies areas that were inaccessible or not cleaned. [96:112.6.14]

50.5.6.1550.6.6.15
Where required, certificates of inspection and cleaning and reports of areas not cleaned shall be submitted to the AHJ. [96:112.6.15]
Metal containers used to collect grease drippings shall be inspected or emptied at least weekly. [96:142.6.16]

**50.5.7.50.6.7** Cooking Equipment Maintenance.

**50.5.7.150.6.7.1**
Inspection and servicing of the cooking equipment shall be made at least annually by properly trained and qualified persons. [96:142.7.1]

**50.5.7.250.6.7.2**
Cooking equipment that collects grease below the surface, behind the equipment, or in cooking equipment flue gas exhaust, such as griddles, deep-fat fryers, or charbroilers, shall be inspected and, if found with grease accumulation, cleaned by a properly trained, qualified, and certified person(s) acceptable to the AHJ. [96:142.7.2]

**50.650.7 Minimum Safety Requirements for Cooking Equipment.**

**50.6.150.7.1** Cooking Equipment.

**50.6.1.150.7.1.1** *
Cooking equipment shall be approved based on one of the following criteria:

1. Listings by a testing laboratory
2. Test data acceptable to the AHJ

[96:132.1.1]

**A.50.6.1.1A.50.7.1.1**
Cooking appliances that are designed for permanent installation, including, but not limited to, ranges, ovens, stoves, broilers, grills, fryers, griddles, and barbecues, should be installed in accordance with the manufacturer's installation instructions.

1. Commercial electric cooking appliances should be listed and labeled in accordance with UL 197.
2. Microwave cooking appliances should be listed and labeled in accordance with UL 923.
3. Oil-burning stoves should be listed and labeled in accordance with UL 896.
4. Wood-fired cooking appliances should be listed and labeled in accordance with UL 737 or UL Subject 2162, or UL Subject 2728, depending on exact appliance type.
5. Gas-fired cooking appliances should be listed and labeled in accordance with ANSI Z83.11.
6. Gas-wood-fired cooking appliances should be listed and labeled in accordance with ANSI Z83.11, UL 737, and/or UL Subject 2162, depending on exact appliance type.

[96: A.133.1.1]
50.6.1.2 Installation.

50.6.1.2.1 All listed appliances shall be installed in accordance with the terms of their listings and the manufacturer's instructions. [96:123.1.2.1]

A.50.6.1.2.1 Gas-fueled appliances should be installed to the requirements of NFPA 54 or NFPA 58. [96:A.123.1.2.1]

50.6.1.2.1.1 Solid fuel used for flavoring within a gas-operated appliance shall be in a solid fuel holder (smoker box) that is listed with the equipment. [96:123.1.2.1.1]

50.6.1.2.2 Cooking appliances requiring protection shall not be moved, modified, or rearranged without prior re-evaluation of the fire-extinguishing system by the system installer or servicing agent, unless otherwise allowed by the design of the fire-extinguishing system. [96:123.1.2.2]

A.50.6.1.2.2 The effectiveness of an automatic extinguishing system is affected by the placement of the nozzles. For this reason, it is essential that cooking appliances be situated in the area in which they were when the extinguishing equipment was designed and installed. If an appliance is moved from under the equipment for cleaning or any other reason, it should be returned to its original position prior to initiation of a cooking operation. [96:A.123.1.2.2]

When appliances are on wheels or casters for ease of cleaning, it is important that the appliance be placed in its design position to ensure that the fire-extinguishing system will be effective. An approved method should ensure that the appliance is returned to its appropriate position before cooking takes place. Channels, markings, or other approved methods assist in ensuring proper placement. [96:A.123.1.2.2]

50.6.1.2.2.1 A solid fuel holder shall not be added to an existing appliance until the fire-extinguishing system has been evaluated by the fire-extinguishing system service provider. [96:123.1.2.2.1]

50.6.1.2.3 The fire-extinguishing system shall not require re-evaluation where the cooking appliances are moved for the purposes of maintenance and cleaning, provided the appliances are returned to approved design location prior to cooking operations, and any disconnected fire-extinguishing system nozzles attached to the appliances are reconnected in accordance with the manufacturer's listed design manual. [96:123.1.2.3]
50.6.1.2.3.1
An approved method shall be provided that will ensure that the appliance is returned to an approved design location. [96:123.1.2.3.1]

A.50.7.1.2.3.1
Wheel chocks that can be fastened to the floor should be installed to ensure that an appliance with casters is returned to its approved design location. [96:A.13.1.2.3.1]

50.6.1.2.450.7.1.2.4
All deep-fat fryers shall be installed with at least a 16 in. (406 mm) space between the fryer and surface flames from adjacent cooking equipment. [96:123.1.2.4]

50.6.1.2.550.7.1.2.5
Where a steel or tempered glass baffle plate is installed at a minimum 8 in. (203 mm) in height between the fryer and surface flames of the adjacent appliance, the requirement for a 16 in. (406 mm) space shall not apply. [96:123.1.2.5]

50.6.1.2.5.150.7.1.2.5.1
If the fryer and the surface flames are at different horizontal planes, the minimum height of 8 in. (203 mm) shall be measured from the higher of the two. [96:123.1.2.5.1]

50.750.8 Mobile and Temporary Cooking Operations.

50.7.150.8.1 General.

50.7.1.150.8.1.1
Mobile and temporary cooking operations shall comply with the requirements of 50.7.1 this section, NFPA 96 and the applicable section for the type of cooking performed.

50.7.1.250.8.1.2
Where required by the AHJ, permits shall be required for the location, design, construction, and operation of mobile and temporary cooking operations.

50.8.1.3
Cooking equipment that is powered on during transit shall be listed as installed for such use. [96:17.1.2]

50.7.1.750.8.1.4 Fire Department Access.
Mobile or temporary cooking operations shall not block fire apparatus access roads, fire lanes, fire hydrants, or other fire protection devices and equipment.

50.7.1.850.8.1.5 Communications.
Where required by the AHJ, an approved method of communication to emergency personnel shall be accessible to all employees.

The address of the current operational location shall be posted and accessible to all employees.

Charcoal and Wood Burning.

Mobile or temporary cooking operations that use wood or charcoal shall comply with Section 14.9 of NFPA 96.

Storage of Flammable and Combustible Liquids
Flammable and combustible liquids shall not be stored inside mobile cooking vehicles or in temporary cooking areas unless stored in accordance with NFPA 30.

Location of Mobile and Temporary Cooking Operations.

Relative to Buildings.
Mobile or temporary cooking operations shall be separated from the entrances and other exits of buildings or structures, combustible materials, vehicles, and other cooking operations by a clear space distance minimum of 10 ft (3 m). [96:17.2.1]

The intent of this section is to also permit separation distances greater than 10 ft (3 m).

Relative to Other Mobile or Temporary Cooking.
Mobile or temporary cooking operations shall be separated from other mobile or temporary cooking operations by a clear distance of 10 ft (3 m). [96:17.2.2]

The intent of this section is to also permit separation distances greater than 10 ft (3 m).

When the mobile unit is parked, the vehicle shall be stabilized so that it will not move, either by jacking the vehicle or placing wheel chocks around the wheels. [96:17.2.3]

Tents.
Mobile or temporary cooking operations conducted in tents shall not take place within tents occupied by the public comply with NFPA 102 and 50.7.1.6.2

Tents shall comply with Chapter 25. [96:17.3.1]

50.7.1.6.3–50.8.3.2
Seating for the public shall not be located within any mobile or temporary cooking vehicle.

50.7.2.4.750.8.4 Cooking Appliance Installation on Vehicles.

50.7.2.4.7.150.8.4.1 Subsection 50.7.2.4.750.8.4 shall apply to the installation of all appliances on vehicles. It shall not apply to engines. [58:6.26.7.1]

50.7.2.4.7.250.8.4.2 All appliances covered by 50.7.2.4.750.8.4 installed on vehicles shall be approved. [58:6.26.7.2]

50.7.2.4.7.3–50.8.4.3 Where the device or appliance, such as a cargo heater or cooler, is designed to be in operation while the vehicle is in transit, means, such as an excess-flow valve, to stop the flow of gas in the event of a line break shall be installed. [58:6.26.7.3]

50.7.2.4.7.4–50.8.4.4 Gas-fired heating appliances shall be equipped with shutoffs in accordance with 5.23.7(A) of NFPA 58, except for portable heaters used with cylinders having a maximum water capacity of 2.7 lb (1.2 kg), portable torches, melting pots, and tar kettles. [58:6.26.7.4]

50.7.2.4.7.5–50.8.4.5 Gas-fired heating appliances, other than ranges and illuminating appliances installed on vehicles intended for human occupancy, shall be designed or installed to provide for a complete separation of the combustion system from the atmosphere inside the vehicle. [58:6.26.7.5]

50.7.2.4.7.650.8.4.6* Where unvented-type heaters that are designed to protect cargo are used on vehicles not intended for human occupancy, provisions shall be made to provide air from the outside for combustion and dispose of the products of combustion to the outside. [58:6.26.7.6]

50.7.2.4.7.750.8.4.7 Appliances installed in the cargo space of a vehicle shall be readily accessible whether the vehicle is loaded or empty. [58:6.26.7.7]
Appliances shall be constructed or otherwise protected to minimize possible damage or impaired operation due to cargo shifting or handling. [58:6.26.7.8]

Appliances shall be located so that a fire at any appliance will not block egress of persons from the vehicle. [58:6.26.7.9]

A permanent caution plate shall be affixed to either the appliance or the vehicle outside of any enclosure. [58:6.26.7.10]

The caution plate shall be adjacent to the container(s). [58:6.26.7.10.1]

The caution plate shall include the following text:

CAUTION:

1. Be sure all appliance valves are closed before opening container valve.
2. Connections at the appliances, regulators, and containers shall be checked periodically for leaks with soapy water or its equivalent.
3. Never use a match or flame to check for leaks.
4. Container valves shall be closed when equipment is not in use.

Gas-fired heating appliances and water heaters shall be equipped with automatic devices designed to shut off the flow of gas to the main burner and the pilot in the event the pilot flame is extinguished. [58:6.26.7.11]

Internal Combustion Engine Power Sources.

Electric generator and internal combustion power sources used for mobile or temporary cooking shall comply with 50.8.5 with 10.15.

Electrical appliances, fixtures, equipment, or wiring other than low-voltage and automotive vehicle circuits or extensions thereof, installed within or on vehicles, shall comply with NFPA 70.

50.8.5.3
An internal combustion engine shall be permitted to be used to operate an electric power generator. [96:17.5.1]

50.8.5.4 Generator units that are not vehicle-mounted while in use shall meet the requirements of 50.8.5.4.1 through 50.8.5.4.3. [96:17.5.2]

50.8.5.4.1 Internal combustion engine power sources shall be located at least 12 ft (4 m) from mobile or temporary cooking operations. [96:17.5.2.1]

50.8.5.4.2 Internal combustion engine power sources shall be isolated from physical contact by the installation of physical guards, fencing, or an enclosure. [96:17.5.2.2]

50.8.5.4.3 Internal combustion engine power sources shall be positioned so that the exhaust complies with the following:

1. Located at least 12 ft (4 m) from openings, air intakes, and means of egress
2. In a position pointed away from any building
3. In a position pointed away from any mobile or temporary cooking operations

[96:17.5.2.3]

50.8.6 Vehicle-Mounted Generators.

50.8.6.1 Vehicle-mounted generators shall meet the requirements of 50.8.6.2 through 50.8.6.5. [96:17.6.1]

50.8.6.2 Internal combustion engine-driven generator units (subject to the provisions of NFPA 1192) shall be listed and installed in accordance with the manufacturer’s instructions and shall be vapor resistant to the interior of the vehicle. [1192:6.4.5.1]

50.8.6.3 Where a generator compartment is used to isolate the installed generator from the vehicle’s interior, or a compartment is provided for the future installation of a generator and is intended to isolate the future generator from the vehicle interior, the generator compartment shall be lined with galvanized steel not less than 26 MSG thick. [1192:6.4.5.2]

50.8.6.3.1 Seams and joints shall be lapped, mechanically secured, and made vapor resistant to the interior of the vehicle. [1192:6.4.5.2.1]
50.8.6.3.2  
Alternative materials and methods of construction shall be permitted in accordance with Section 1.4.  
[1192:6.4.5.2.2]

50.8.6.4  
Liquid fuel lines and exhaust systems shall not penetrate into the area.  
[1192:6.4.5.2.3]

50.8.6.5  
Holes into the living area shall be sealed.  
[1192:6.4.5.2.4]

50.7.2.250.8.7  LP-Gas Systems.  

50.7.2.2.2–50.8.7.1  

LP-Gas systems on mobile cooking vehicles operations shall comply with NFPA 58 and this section.  
[96:17.7.1]

50.7.2.2.1–50.8.7.1.1  
LP-Gas cylinders shall be secured in an upright position to prevent tipping over.  
[96:17.7.1.1]

50.78.7.1.22.3–50.8.7.1.2  
Where a shutoff valve is provided, it shall be readily accessible and identified with a sign permanently affixed to the vehicle in reflective decal material with letters a minimum of 2 in. (50 mm) high.

50.7.2.4.650.8.7.2  Equipment Installation.  
Equipment shall be installed in accordance with Section 6.20 of NFPA 58, 50.7.2.4.6.150.8.7.2.1, and 50.7.2.4.6.250.8.7.2.2.  
[58:6.26.6]

50.7.2.4.6.150.8.7.2.1  
Installation shall be made in accordance with the manufacturer’s recommendations and, in the case of approved equipment, as provided in the approval.  
[58:6.26.6.1]

50.7.2.4.6.250.8.7.2.2  
Equipment installed on vehicles shall be protected against vehicular damage as provided for container appurtenances and connections in 50.7.2.4.3.4.550.8.7.3.7.5.  
[58:6.26.6.2]

50.7.2.350.8.7.3  LP-Gas System Leak Detection.  

A.50.7.2.39.7.2  
The certification documentation might consist of the following:

(1) The name of the certification company
The license number, certificate of fitness number or other applicable identifying number that demonstrates the certification company is approved to install, inspect, and maintain LP-Gas systems.

The corporate name of the mobile food service business.

The identifying name on the side of the mobile food vehicle.

Date of inspection.

Vehicle tag number and VIN.

A signed statement by the agent for the certification company that reads: The LP-Gas system has been inspected for compliance with the current edition of NFPA 58 and found to be in compliance with the provisions of the code. In addition, leak detection has been conducted on the LP-Gas system piping and the piping has been found to maintain integrity.

50.8.7.3.1

All mobile and temporary cooking operations equipped with a propane appliance and an electrical system shall be equipped with a propane detector listed and marked on the device as being suitable for use in the vehicles under the requirements of UL 1484, and installed according to the terms of its listing. [96:17.7.2.1]

50.7.2.3.3–50.8.7.2.2

The LP-Gas leak detection system has been installed, it shall be tested every monthly. [96:17.7.2.2]

50.7.2.3.1–50.8.7.2.3

LP-Gas systems shall be inspected prior to each use by a worker trained in accordance with 50.7.1.8. [96:17.7.2.3]

50.8.7.2.4

LP-Gas leak detection testing shall be performed every time a new LP-Gas connection is made or an LP-Gas cylinder is changed out. [96:17.7.2.4]

50.7.2.3.2–50.8.7.2.5

LP-Gas leak detection testing shall be documented and the documentation be held in the mobile or temporary unit and made available to the AHJ upon request in accordance with 50.7.2.3.4. [96:17.7.2.5]

50.7.2.3.4*

LP-Gas systems on mobile food service vehicles shall be certified for compliance with NFPA 58 by an approved company with expertise in the installation, inspection, and maintenance of LP-Gas systems.

50.7.2.3.4.1

The certification shall be good for one year.

50.7.2.3.4.2
Recertification shall occur every time an appliance is replaced or added and if a piping connection is modified in anyway.

50.7.2.3.4.2.1
A change in cylinder shall not be considered a piping connection modification.

50.7.2.3.4.3
Mobile food service vehicles equipped with an LP-Gas system, but without a current approved LP-Gas certification, shall not be permitted to be operated for mobile food service.

50.7.2.450.8.7.3 LP-Gas Systems on Vehicles (Other than Engine Fuel Systems).

50.7.2.4.150.8.7.3.1 Application.
Section 50.7.2.450.8.7.3 shall apply to the following:

1. Nonengine fuel systems on all vehicles
2. Installations served by exchangeable (removable) cylinder systems and by permanently mounted containers.

50.7.2.4.250.8.7.3.2 Nonapplication.
Section 50.7.2.450.8.7.3 shall not apply to the following:

1. Systems installed on mobile homes
2. Systems installed on recreational vehicles
3. Cargo tank vehicles, including trailers and semitrailers, and similar units used to transport LP-Gas as cargo, which are covered by Chapter 9 of NFPA 58.
4. LP-Gas engine fuel systems on the vehicles, which are covered by Chapter 11 of NFPA 58.

50.7.2.4.350.8.7.3.3 LP-Gas Container Installation Requirements.

50.7.2.4.3.1 Containers shall comply with 50.7.2.4.3.1.1 through 50.7.2.4.3.1.5.

50.7.2.4.3.1.1–50.8.7.3.3.1 Only ASME mobile LP-Gas containers shall be in accordance with one of the following shall be used:

1. A maximum allowable working pressure (MAWP) of 312 psig (2.2 MPag) or higher where for LP-Gas containers installed in the enclosed spaces of vehicles.
2. A MAWP of 312 psig (2.2 MPag) or higher where installed on passenger vehicles.
3. A maximum allowable working pressure (MAWP) of 250 psig (1.7 MPag) or higher for LP-Gas containers where-installed on the exterior of nonpassenger vehicles.
LP-Gas fuel containers installed on passenger-carrying vehicles shall not exceed 200 gal (0.8 m³) aggregate water capacity. [96:17.7.3.1.2]

Disconnected LP-Gas containers and LP-Gas cylinders for purposes other than engine fuel systems shall not be transported or stored inside the vehicle. [96:17.7.3.2]

All other LP-Gas containers and LP-Gas cylinders in storage shall comply with Section 10.5 of NFPA 96 and Chapter 69. [96:17.7.3.3]

The capacity of individual LP-Gas containers on highway nonpassenger vehicles shall 1000 gal (3.8 m³) or in accordance with U.S. Department of Transportation regulations.

The capacity of cargo tank motor vehicles shall not be limited by NFPA 58.

Containers designed for stationary service only and not in compliance with the container appurtenance protection requirements of 5.2.6 of NFPA 58 shall not be used. [58:6.26.3.1(E)]

ASME containers and cylinders utilized for the purposes covered by 50.7.2.4 shall not be installed, transported, or stored (even temporarily) inside any vehicle covered by 50.7.2.4, except for ASME containers installed in accordance with 50.7.2.4.3.4.9, Chapter 9 of NFPA 58, or DOT regulations. [58:6.26.3.2]

The LP-Gas supply system, including the containers, shall be installed either on the outside of the vehicle or in a recess or cabinet vaportight to the inside of the vehicle but accessible from and vented to the outside, with the vents located near the top and bottom of the enclosure and 3 ft (1 m) horizontally away from any opening into the vehicle below the level of the vents. [58:6.26.3.3]

Containers shall be mounted securely on the vehicle or within the enclosing recess or cabinet. [58:6.26.3.4]

Containers shall be installed with road clearance in accordance with 11.8.3 of NFPA 58. [58:6.26.3.4(A)]
Fuel containers shall be mounted to prevent jarring loose and slipping or rotating, and the fastenings shall be designed and constructed to withstand, without permanent visible deformation, static loading in any direction equal to four times the weight of the container filled with fuel. [58:6.26.3.4(B)]

50.7.2.4.3.4.3–50.8.7.3.7.3
Where containers are mounted within a vehicle housing, the securing of the housing to the vehicle shall comply with this provision. Any removable portions of the housing or cabinet shall be secured while in transit. [58:6.26.3.4(C)]

50.7.2.4.3.4.4–50.8.7.3.7.4
Field welding on containers shall be limited to attachments to nonpressure parts such as saddle plates, wear plates, or brackets applied by the container manufacturer. [58:6.26.3.4(D)]

50.7.2.4.3.4.5–50.8.7.3.7.5
All container valves, appurtenances, and connections shall be protected to prevent damage from accidental contact with stationary objects; from loose objects, stones, mud, or ice thrown up from the ground or floor; and from damage due to overturn or similar vehicular accident. [58:6.26.3.4(E)]

50.7.2.4.3.4.6–50.8.7.3.7.6
Permanently mounted ASME containers shall be located on the vehicle to provide the protection specified in 50.7.2.4.3.4.550.8.7.3.7.5. [58:6.26.3.4(F)]

50.7.2.4.3.4.7–50.8.7.3.7.7
Cylinders shall have permanent protection for cylinder valves and connections. [58:6.26.3.4(G)]

50.7.2.4.3.4.8–50.8.7.3.7.8
Where cylinders are located on the outside of a vehicle, weather protection shall be provided. [58:6.26.3.4(H)]

50.7.2.4.3.4.9–50.8.7.3.7.9
Containers mounted on the interior of passenger-carrying vehicles shall be installed in compliance with Section 11.9 of NFPA 58. Pressure relief valve installations for such containers shall comply with 11.8.5 of NFPA 58. [58:6.26.3.4(I)]

50.8.7.3.8
Where equipment such as a cargo heater or cooler is designed to be in operation while the vehicle is in transit, means such as an excess-flow valve to stop the flow of gas in the event of a line break shall be installed. [96:17.7.3.6]

50.8.7.3.9
Cylinders shall be retested every 5 to 12 years in accordance with the manufacturer’s recommendations and 49 CFR 180.205:

1. No letter after the requalification date means the cylinder must be retested within 12 years.
(2) “S” means the cylinder must be retested within 7 years.
(3) “E” means the cylinder must be retested within 5 years.

50.7.2.4.4 50.8.7.4 Installation of **LP-Gas** Container Appurtenances.

50.7.2.4.4.1–50.8.7.4.1

Container appurtenances shall be installed in accordance with the following:

1. Pressure relief valve installation on ASME containers installed in the interior of vehicles complying with Section 11.9 of NFPA 58 shall comply with 11.8.5 of NFPA 58.
2. Pressure relief valve installations on ASME containers installed on the outside of vehicles shall comply with 11.8.5 of NFPA 58 and 50.7.2.4.4.2 50.8.7.3.6.
3. Main shutoff valves on containers for liquid and vapor shall be readily accessible.
4. Cylinders shall be designed to be filled in either the vertical or horizontal position, or if they are the universal type, they are permitted to be filled in either position.
5. All container inlets, outlets, or valves installed in container inlets or outlets, except pressure relief devices and gauging devices, shall be labeled to designate whether they communicate with the vapor or liquid space.
6. Containers from which only vapor is to be withdrawn shall be installed and equipped with connections to minimize the possibility of the accidental withdrawal of liquid.

50.8.7.4.2

Propane containers shall be so located that the discharge from their pressure relief valves shall be not less than 3 ft (0.9 m) measured horizontally along the surface of the vehicle from any of the following located below the level of such discharge:

(1) Openings into the vehicle
(2) Propane-burning appliance intake and exhaust vents
(3) All combustion engine and hydronic heating appliance exhaust terminations

50.7.2.4.4.2–50.8.7.5

Regulators shall be installed in accordance with 6.10.2 of NFPA 58 and 50.7.2.4.4.2.1 50.8.7.5.1 through 50.7.2.4.4.2.5 50.8.7.5.5. [58:6.26.4.2]

50.7.2.4.4.2.1–50.8.7.5.1

Regulators shall be installed with the pressure relief vent opening pointing vertically downward to allow for drainage of moisture collected on the diaphragm of the regulator. [58:6.26.4.2(A)]

50.7.2.4.4.2.2–50.8.7.5.2

Regulators not installed in compartments shall be equipped with a durable cover designed to protect the regulator vent opening from sleet, snow, freezing rain, ice, mud, and wheel spray. [58:6.26.4.2(B)]
If vehicle-mounted regulators are installed at or below the floor level, they shall be installed in a compartment that provides protection against the weather and wheel spray. [58:6.26.4.2(C)]

Regulator compartments shall comply with the following:

1. The compartment shall be of sufficient size to allow tool operation for connection to and replacement of the regulator(s).
2. The compartment shall be vaportight to the interior of the vehicle.
3. The compartment shall have a 1 in.² (650 mm²) minimum vent opening to the exterior located within 1 in. (25 mm) of the bottom of the compartment.
4. The compartment shall not contain flame or spark-producing equipment. [58:6.26.4.2(D)]

A regulator vent outlet shall be at least 2 in. (51 mm) above the compartment vent opening. [58:6.26.4.2(E)]

Gas Piping.

Piping shall be installed in accordance with 6.11.3 of NFPA 58 and 50.7.2.4.5.1.1 through 50.7.2.4.5.1.13. [58:6.26.5.1]

Steel tubing shall have a minimum wall thickness of 0.049 in. (1.2 mm). [58:6.26.5.1(A)]

A flexible connector shall be installed between the regulator outlet and the fixed piping system to protect against expansion, contraction, jarring, and vibration strains. [58:6.26.5.1(B)]

Flexibility shall be provided in the piping between a cylinder and the gas piping system or regulator. [58:6.26.5.1(C)]

Flexible connectors shall be installed in accordance with 6.11.6 of NFPA 58. [58:6.26.5.1(D)]

Flexible connectors longer than the length allowed in NFPA 58, or fuel lines that incorporate hose, shall be used only where approved. [58:6.26.5.1(E)]
50.7.2.4.5.1.6–50.8.7.6.1.6
The fixed piping system shall be designed, installed, supported, and secured to minimize the possibility of damage due to vibration, strains, or wear and to preclude any loosening while in transit. [58:6.26.5.1(F)]

50.7.2.4.5.1.7–50.8.7.6.1.7
Piping shall be installed in a protected location. [58:6.26.5.1(G)]

50.7.2.4.5.1.8–50.8.7.6.1.8
Where piping is installed outside the vehicle, it shall be installed as follows:

1. Piping shall be under the vehicle and below any insulation or false bottom.
2. Fastening or other protection shall be installed to prevent damage due to vibration or abrasion.
3. At each point where piping passes through sheet metal or a structural member, a rubber grommet or equivalent protection shall be installed to prevent chafing. [58:6.26.5.1(H)]

50.7.2.4.5.1.9–50.8.7.6.1.9
Gas piping shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance served. [58:6.26.5.1(I)]

50.7.2.4.5.1.10–50.8.7.6.1.10
If a branch line is installed, the tee connection shall be located in the main gas line under the floor and outside the vehicle. [58:6.26.5.1(J)]

50.7.2.4.5.1.11–50.8.7.6.1.11
Exposed parts of the fixed piping system either shall be of corrosion-resistant material or shall be coated or protected to minimize exterior corrosion. [58:6.26.5.1(K)]

50.7.2.4.5.1.12–50.8.7.6.1.12
Hydrostatic relief valves shall be installed in isolated sections of liquid piping as provided in Section 6.15 of NFPA 58. [58:6.26.5.1(L)]

50.7.2.4.5.1.13–50.8.7.6.1.13
Piping systems, including hose, shall be pressure tested and proven free of leaks in accordance with Section 6.16 of NFPA 58. [58:6.26.5.1(M)]

50.7.2.4.5.2–50.8.7.6.2
There shall be no fuel connection between a tractor and trailer or other vehicle units. [58:6.26.5.2]

50.7.2.4.1250.8.7.6.3
After installation or modification, piping systems (including hose) shall be proven free of leaks at not less than the normal operating pressure. [58:6.16.1.1]
Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the regulations of the U.S. Department of Transportation (DOT 49 CFR); Federal Aviation Administration (FAA 14 CFR); the ASME *Boiler and Pressure Vessel Code*, Section VIII, “Rules for the Construction of Unfired Pressure Vessels”; or the API-ASME *Code for Unfired Pressure Vessels for Petroleum Liquids and Gases*, except for UG-125 through UG-136. [58:5.2.1.1]

Prior to April 1, 1967, regulations of the U.S. Department of Transportation were promulgated by the Interstate Commerce Commission. In Canada, the regulations of the Canadian Transport Commission apply and are available from the Canadian Transport Commission, Union Station, Ottawa, Canada. [58:A.5.2.1.1]

Construction of containers to the API-ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases has not been authorized after July 1, 1961. [58:A.5.2.1.1]

Used containers constructed to specifications of the Association of American Railroads shall not be installed. [58:5.2.1.1(A)]

Adherence to applicable ASME Code case interpretations and addenda that have been adopted and published by ASME 180 calendar days prior to the effective date of NFPA 58 shall be considered as compliant with the ASME Code. [58:5.2.1.1(B)]

Where containers fabricated to earlier editions of regulations, rules, or codes listed in 50.7.2.4.1050.8.7.6.4, and of the Interstate Commerce Commission (ICC) *Rules for Construction of Unfired Pressure Vessels*, prior to April 1, 1967, are used, the requirements of Section 1.4 of NFPA 58 shall apply. [58:5.2.1.1(C)]

Containers that have been involved in a fire and show no distortion shall be requalified for continued service before being used or reinstalled. [58:5.2.1.2]

Cylinders shall be requalified by a manufacturer of that type of cylinder or by a repair facility approved by DOT. [58:5.2.1.2(A)]

ASME or API-ASME containers shall be retested using the hydrostatic test procedure applicable at the time of the original fabrication. [58:5.2.1.2(B)]
**50.7.2.4.11.350.8.7.6.5.3**
All container appurtenances shall be replaced. [58:5.2.1.2(C)]

**50.7.2.4.11.450.8.7.6.5.4**
DOT 4E specification (aluminum) cylinders and composite cylinders involved in a fire shall be removed from service. [58:5.2.1.1(D)5.2.1.2(D)]

**50.7.2.4.1350.8.7.6.6** General Location of Cylinder Storages.

**50.7.2.4.13.150.8.7.6.6.1**
Cylinders in storage shall be located to minimize exposure to excessive temperature rises, physical damage, or tampering. [58:8.2.1.1]

**50.7.2.4.13.250.8.7.6.6.2**
Cylinders in storage having individual water capacity greater than 2.7 lb (1.1 kg) [nominal 1 lb (0.45 kg) LP-Gas capacity] shall be positioned so that the pressure relief valve is in direct communication with the vapor space of the cylinder. [58:8.2.1.2]

**50.7.2.4.13.350.8.7.6.6.3**
Cylinders stored in buildings in accordance with Section 8.3 of NFPA 58 shall not be located near exits, near stairways, or in areas normally used, or intended to be used, for the safe egress of occupants. [58:8.2.1.3]

**50.7.2.4.13.450.8.7.6.6.4**
If empty cylinders that have been in LP-Gas service are stored indoors, they shall be considered as full cylinders for the purposes of determining the maximum quantities of LP-Gas permitted by 8.3.1, 8.3.2.1, and 8.3.3.1 of NFPA 58. [58:8.2.1.4]

**50.7.2.4.13.550.8.7.6.6.5**
Cylinders shall not be stored on roofs. [58:8.2.1.5]

**50.7.2.4.1450.8.7.6.7** Protection of Valves on LP-Gas Cylinders in Storage.

**50.7.2.4.14.1–50.8.7.6.7.1**
Cylinder valves shall be protected as required by 5.2.6.1 and 7.2.2.5 of NFPA 58. [58:8.2.2.1]

**50.7.2.4.14.2–50.8.7.6.7.2**
Screw-on-type caps or collars shall be in place on all cylinders stored, regardless of whether they are full, partially full, or empty, and cylinder outlet valves shall be closed. [58:8.2.2.2]

**50.7.2.4.14.3–50.8.7.6.7.3**
Valve outlets on cylinders less than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] shall be plugged, capped, or sealed in accordance with 7.2.2.5 of NFPA 58. [58:8.2.2.3]

### 50.7.2.4.150.8.7.7 Transportation of Cylinders.

#### 50.7.2.4.150.8.7.7.1
Cylinders having an individual water capacity not exceeding 1000 lb (454 kg) [nominal 420 lb (191 kg) propane capacity], when filled with LP-Gas, shall be transported in accordance with the requirements of Section 9.3 of NFPA 58. [58:9.3.2.1]

#### 50.7.2.4.150.8.7.7.2
Cylinders shall be constructed as provided in Section 5.2 of NFPA 58 and equipped in accordance with Section 5.75.9 of NFPA 58 for transportation as cylinders. [58:9.3.2.2]

#### 50.7.2.4.150.8.7.7.3
The quantity of LP-Gas in cylinders shall be in accordance with Chapter 7 of NFPA 58. [58:9.3.2.3]

#### 50.7.2.4.150.8.7.7.4
Cylinder valves shall comply with the following:

1. Valves of cylinders shall be protected in accordance with 5.2.6.1 of NFPA 58.
2. Screw-on-type protecting caps or collars shall be secured in place.
3. The provisions of 7.2.2.5 of NFPA 58 shall apply. [58:9.3.2.4]

#### 50.7.2.4.150.8.7.7.5
The cargo space of the vehicle shall be isolated from the driver’s compartment, the engine, and the engine’s exhaust system. [58:9.3.2.5]

#### 50.7.2.4.150.8.7.7.5.1
Open-bodied vehicles shall be considered to be in compliance with this provision. [58:9.3.2.5(A)]

#### 50.7.2.4.150.8.7.7.5.2
Closed-bodied vehicles having separate cargo, driver, and engine compartments shall be considered to be in compliance with this provision. [58:9.3.2.5(B)]

#### 50.7.2.4.150.8.7.7.5.3
Closed-bodied vehicles, such as passenger cars, vans, and station wagons, shall not be used for transporting more than 215 lb (98 kg) water capacity [nominal 90 lb (41 kg) propane capacity], but not more than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] per cylinder, unless the driver and engine compartments are separated from the cargo space by a vaportight partition that contains no means of access to the cargo space. [58:9.3.2.5(C)]
50.7.2.4.15.6
Cylinders and their appurtenances shall be determined to be leak-free before being loaded into vehicles. [58:9.3.2.6]

50.7.2.4.15.7
Cylinders shall be loaded into vehicles with flat floors or equipped with racks for holding cylinders. [58:9.3.2.7]

50.7.2.4.15.8
Cylinders shall be fastened in position to minimize the possibility of movement, tipping, and physical damage. [58:9.3.2.8]

50.7.2.4.15.9
Cylinders being transported by vehicles shall be positioned in accordance with Table 50.7.2.4.15.9. [58:9.3.2.9]

Table 50.7.2.4.15.9
<table>
<thead>
<tr>
<th>Propane Capacity of Cylinder</th>
<th>Open Vehicles</th>
<th>Enclosed Spaces of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>≤45</td>
<td>≤20</td>
<td>Any position</td>
</tr>
<tr>
<td>&gt;45</td>
<td>&gt;20</td>
<td>Relief valve in communication with the vapor space</td>
</tr>
<tr>
<td>≤4.2</td>
<td>≤1.9</td>
<td>Any position</td>
</tr>
<tr>
<td>&gt;4.2</td>
<td>&gt;1.9</td>
<td>Relief valve in communication with the vapor space</td>
</tr>
</tbody>
</table>

[58:Table 9.3.2.9]

50.7.2.4.15.10
Vehicles transporting cylinders where the total weight is more than 1000 lb (454 kg), including the weight of the LP-Gas and the cylinders, shall be placarded as required by DOT regulations or state law. [58:9.3.2.10]

50.8.8 Electrical Wiring.

50.8.8.1
Vehicle-mounted generators shall comply with the provisions of NFPA 70, Article 551, Part III. [96:17.8.1]

50.8.8.2
The manufacturer of an engine generator unit intended for installation in a recreational vehicle shall provide instructions for the safe and effective installation, operation, and servicing of the generator. [96:17.8.2]

50.8.8.3
Refueling of internal combustion engine power sources shall be permitted only when the electric generators and internal combustion power sources are not in use. [96:17.8.3]

50.8.8.3.1
Refueling of internal combustion engines shall not be allowed during mobile or temporary cooking operations. [96:17.8.3.1]

50.8.8.3.2
Refueling of internal combustion engine power sources from a container shall be permitted when the engine is shut down and the surface temperature of the engine and fuel tank is below the autoignition temperature of the fuel. [96:17.8.3.2]

50.8.9 Carbon Monoxide Detectors.

50.7.1.11.2 50.8.9.1
If the heat source is nonelectric and open flames are used, at least one approved carbon monoxide detector shall be installed where mobile cooking operations are performed in an enclosed area. [96:17.9.1]

50.7.1.950.8.10 Training.

50.7.1.9.150.8.10.1*
Prior to performing mobile or temporary cooking operations, one worker shall be provided with initial training in emergency response procedures, including the following:

1. Proper usage of portable fire extinguishers and extinguishing systems
2. Proper method of shutting off fuel sources
3. Proper procedure for notifying the local fire department
4. Proper refueling of internal combustion engine power sources and LP-Gas container change-out
5. How to perform leak detection of LP-Gas
6. Understanding fuel properties

[96:17.10.1]

A.50.7.1.9.1
An approved method of leak detection would include pressurizing the LP-Gas system with LP-Gas and utilizing a gas meter to detect the presence of LP-Gas around the tank, piping, and appliances.
50.8.10.2
During the time of cooking operation at least one person in the vehicle shall be trained to provide the functions listed in 50.8.10.1. [96:17.10.2]

50.8.10.3
The provision of training shall be the responsibility of the owner, and the training program and materials shall be acceptable to the AHJ. [96:17.10.3]

50.7.1.9.2–50.8.10.4
Refresher training shall be provided every year annually. [96:17.10.4]

50.7.1.9.3–50.8.10.5
Initial and refresher training shall be documented, and the documentation shall be held in the mobile unit and made available to the AHJ upon request. [96:17.10.5]

50.8.10.6
The address of the current operational location shall be posted and accessible to all employees. [96:17.10.6]

50.7.2.4.9–50.8.11 Parking, Servicing, and Repair.

50.7.2.4.9.1–50.8.11.1
Where vehicles with LP-Gas fuel systems used for purposes other than propulsion are parked, serviced, or repaired inside buildings, the requirements of 50.8.11.250.7.2.4.9.2 through 50.8.11.450.7.2.4.9.4 shall apply. [58:6.26.8.1]

50.7.2.4.9.2–50.8.11.2
The fuel system shall be leak-free, and the container(s) shall not be filled beyond the limits specified in Chapter 7 of NFPA 58. [58:6.26.8.2]

50.7.2.4.9.3–50.8.11.3
The container shutoff valve shall be closed, except that the container shutoff valve shall not be required to be closed when fuel is required for test or repair. [58:6.26.8.3]

50.7.2.4.9.4–50.8.11.4
The vehicle shall not be parked near sources of heat, open flames, or similar sources of ignition, or near unventilated pits. [58:6.26.8.4]

50.7.2.4.9.5–50.8.11.5
Vehicles having containers with water capacities larger than 300 gal (1.1 m³) shall comply with the requirements of Section 9.7 of NFPA 58. [58:6.26.8.5]
50.7.1.3 - 50.8.11.6
Wheel chocks shall be used provided to prevent mobile and temporary cooking units from moving. [96:17.11.5]

50.7.2 - Mobile Cooking

50.7.2.1 - General
Mobile cooking operations and equipment shall comply with 50.7.1, 50.7.2, and NFPA 96.

50.7.2.4 - 50.8.12 - General Precautions

50.7.2.4.8 - 50.8.12.1
All fat fryers shall have a lid over the oil vat that can be secured to prevent the spillage of cooking oil during transit. This lid shall be secured at all times when the vehicle is in motion.

50.7.3 - Temporary Cooking

50.7.3.1 -
Temporary cooking operations and equipment shall comply with NFPA 96, Section 50.7.1 and Section 50.7.3.

50.7.3.2 -
Temporary cooking equipment and installations shall comply with NFPA 58.

50.7.3.3 -
Deep fat fryers, fry-o-lators, or other appliances having combustible liquids heated by LP Gas, solid fuels, or electricity shall be protected by an approved hood fire suppression system or other approved means of extinguishment in the event of fire.

F.3 References for Extracts in Informational Sections
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1496 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

Technical Merit: Emergency Nature:
0 Abstentions 0 Abstentions
21 Agree (w/comment: Hanselka, Peterkin) 21 Agree (w/comment, Clary, Hanselka, Peterkin)
0 Disagree 0 Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible} \div 2 = 15 + 1 = (16)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 16.

\(30 \text{ eligible to vote} - 9 \text{ not returned} - 0 \text{ abstentions} = 21 \times 0.75 = 15.75\)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
PROPOSED TIA NO. 1496 BALLOT - FINAL RESULTS

QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1496 on various 96 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

Eligible to Vote: 30
Not Returned: 9
F. Tom Fangmann, Brent L.
Christopherson, Richard L. Day, Richard
Kluge, Steven Taulbee, Philip
Myers, Andrew Fukuda, H. Butch
Browning, Jr., Marvin Dwayne Garriss

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<th>Votes</th>
<th>Comments</th>
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<td>21</td>
<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>Agree with updating extracts.</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
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</tr>
<tr>
<td>Catherine L. Stashak</td>
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<td>Agree</td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
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<td>Agree</td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
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<tr>
<td>Carl F. Baldassarre</td>
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<td>Agree with updating extracts.</td>
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<tr>
<td>Kenneth E. Bush</td>
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</tr>
<tr>
<td>Scott M. Bryant</td>
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<td>Agree</td>
</tr>
<tr>
<td>Sarina L. Hart</td>
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<td>Agree</td>
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<tr>
<td>John A. Sharry</td>
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<tr>
<td>Wade Palazini</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
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<td>Agree</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>Fire Safety provisions are necessary</td>
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<tr>
<td>Scott T. Laramee</td>
<td></td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
<td>Terin Hopkins</td>
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</tr>
<tr>
<td>Kelly T. Nicolello</td>
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<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<td>Kenneth Earl Tyree, Jr.</td>
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<td>Brian L. Olsen</td>
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</table>

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 30
Not Returned: 9
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, H. Butch Browning, Jr., Marvin Dwayne Garriss

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<td>Agree</td>
<td>21</td>
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<td>James S. Peterkin</td>
<td></td>
<td>These extracted text changes should be included with this upcoming edition.</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.</td>
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<tr>
<td>Catherine L. Stashak</td>
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<td></td>
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<tr>
<td>Anthony C. Apfelbeck</td>
<td>A, B, C and D</td>
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<tr>
<td>Richard Jay Roberts</td>
<td>B</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
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<tr>
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<td>Kenneth E. Bush</td>
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<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<tr>
<td>Sarina L. Hart</td>
<td>A</td>
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<td>John A. Sharry</td>
<td>A &amp; B</td>
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<tr>
<td>Wade Palazini</td>
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<tr>
<td>Robert J. Davidson</td>
<td>A and B</td>
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<tr>
<td>Reinhard Hanselka</td>
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<td>Correcting issues makes this a high priority</td>
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<tr>
<td>Terin Hopkins</td>
<td>F</td>
<td>The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
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<tr>
<td>Kelly T. Nicolello</td>
<td>Agree</td>
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<tr>
<td>Raymond C. O’Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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</table>
Kenneth Earl Tyree, Jr.  
A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan  
The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen  
B.  
I agree

Scott T. Laramee  
Disagree 0

Abstain 0
SEE ATTACHED FOR REVISIONS

**Substantiation:** The current text of NFPA 1 contains extracts from the last published edition of NFPA 101 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 101 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

**Emergency Nature:** The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
NFPA 1-2018 text updated per revisions to NFPA 101 for 2021 editions

2.3.1 ANSI Publications.

2.3.7 ASTM Publications.

2.3.18 UL Publications.
UL 1278, Movable and Wall- or Ceiling-Hung Electric Room Heaters, 2014, revised 2018.
UL 1315, Metal Waste Paper Containers, 2017.

2.4 References for Extracts in Mandatory Sections.

3.3.30 *Building.
Any structure used or intended for supporting or sheltering any use or occupancy. [101, 202118]

A.3.3.30 Building.
The term building is to be understood as if followed by the words or portions thereof. (See also A.3.3.271, Structure.) [101, 202118]

3.3.30.5 *Existing Building.
A building erected or officially authorized prior to the effective date of the adoption of this edition of the Code by the agency or jurisdiction. [101, 202118]

A.3.3.30.5 Existing Building.
With respect to judging whether a building should be considered existing, the deciding factor is not when the building was designed or when construction started but, rather, the date plans were approved for construction by the appropriate AHJ. [101, 202118]

3.3.30.10 *Special Amusement Building.
A building or portion thereof that is temporary, permanent, or mobile and contains a device or system device that conveys passengers patrons where the patrons can be contained or restrained, or provides a walkway along, around, or over a course in any direction as a form of amusement or entertainment, and arranged so that the egress path is not readily apparent due to visual or audio distractions, contains or an intentionally confounded egress path, or is not readily available due to the mode of conveyance through the building or structure. [101, 202118]

A.3.3.30.10 Special Amusement Building.
Special amusement buildings include amusements typically found in theme parks such as a roller coaster–type ride within a building, a multilevel play structure within a building, a submarine ride, and
similar amusements where the occupants are not in the open air and might or might not be confined to a ride vehicle and/or unable to self-evacuate. Examples of temporary special amusement buildings include mobile fun houses typically found in carnivals or a gymnasium converted to a haunted house for Halloween. [101, 2021]

Three conditions are essential to the definition of a special amusement building:

First, the area might be either an entire building or a portion of a building. A rollercoaster within a theme park would not be a special amusement building if it is open to the air along its entire length. On the other hand, if portions of the rollercoaster were partially enclosed within buildings that house the show elements, it would then be a special amusement building. [101, 2021]

Second, a special amusement building contains either an amusement ride or device, or a walkway over a course intended to provide amusement or entertainment. A theater with fixed seats and a performance platform or stage would typically not be a special amusement building because there is no amusement ride or device, and there is no walkway that is used to provide amusement or entertainment. [101, 2021]

Third, a special amusement building is intended to either divert the patron’s attention away from the egress path, either through audio or visual distractions or by intentionally confounding the patron, or it contains or restrains the patron such that the patron is unable to self-evacuate when the amusement ride has ceased motion. A carousel or small train inside a shopping mall might not be considered to be a special amusement building if, once ride motion has ceased, the patron can step out of the vehicle without assistance and is aware of the egress path. [101, 2021]

Other occupancies might also fall into the classification of special amusement building if the conditions described in the definition apply. Escape rooms are an example of where such conditions might exist. It is incumbent on the authority having jurisdiction to inquire if the conditions in the escape room meet the definition of a special amusement building. Where such conditions exist, escape rooms should be classified as special amusement buildings. Where such conditions do not exist, escape rooms might be classified as another occupancy type, such as business. [101, 2021]

It is important for the authority having jurisdiction to recognize that the Code requires an occupancy to be classified as a special amusement building if the conditions in the space meet the definition of special amusement building, regardless of the occupant load of the space. No minimum occupant load threshold must be met for a space to be classified as a special amusement building. A space could be classified as a special amusement building even where the occupant load is significantly fewer than the 50 occupants required for classification of other assembly occupancies. [101, 2021]

The requirements for special amusement buildings are not intended to apply to the design of the actual amusement ride or device, but rather that of the facility that houses the ride or device. The design of an amusement ride or device, including all platforms and stairs that are attached to the ride structure, is governed by other standards, such as ASTM F2291, Standard Practice for Design of Amusement Rides or Devices. The design of facilities elements around the ride, including stairs and platforms that are not
part of the ride structure, should be in accordance with the applicable requirements of this Code. [101, 2021]

Special amusement buildings include amusements such as a haunted house, a roller coaster–type ride within a building, a multilevel play structure within a building, a submarine ride, and similar amusements where the occupants are not in the open air. [101, 2018]

3.3.61 Combustible (Material).
A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible or limited-combustible. [101, 2021]

3.3.70 *Common Path of Travel.
The portion of exit access that must be traversed before two separate and distinct paths of travel to two exits are available. [101, 2021]

A.3.3.70 Common Path of Travel.
Common path of travel is measured in the same manner as travel distance but terminates at that point where two separate and distinct routes become available. Paths that merge are common paths of travel. [101, 2021]

3.3.71.1 *Fire Compartment.
A space within a building that is enclosed by fire barriers on all sides, including the top and bottom. [101, 2021]

A.3.3.71.1 Fire Compartment.
Additional fire compartment information is contained in 8.2.2 of NFPA 101. [101, 2021]

In the provisions for fire compartments utilizing the outside walls of a building, it is not intended that the outside wall be specifically fire resistance rated, unless required by other standards. Likewise, it is not intended that outside windows or doors be protected, unless specifically required for exposure protection by another section of this Code, by NFPA 101, or by other standards. [101, 2021]

3.3.71.2 *Smoke Compartment.
A space within a building enclosed by smoke barriers on all sides, including the top and bottom. [101, 2021]

A.3.3.71.2 Smoke Compartment.
Where smoke compartments using the outside walls or the roof of a building are provided, it is not intended that outside walls or roofs, or any openings therein, be capable of resisting the passage of smoke. Application of smoke compartment criteria where required elsewhere in NFPA 101, should be in accordance with Section 8.5 of NFPA 101. [101, 2021]

3.3.108 *Existing.
That which is already in existence on the date this edition of the Code goes into effect. [101, 2021]
A.3.3.108 Existing.
See A.3.3.30.5, Existing Building. [101, 202118]

3.3.110 *Exit.
That portion of a means of egress that is separated from all other spaces of the building or structure by construction, location, or equipment as required to provide a protected way of travel to the exit discharge. [101, 202118]

A.3.3.110 Exit.
Exits include exterior exit doors, exit passageways, horizontal exits, exit stairs, and exit ramps. In the case of a stairway, the exit includes the stair enclosure, the door to the stair enclosure, the stairs and landings inside the enclosure, the door from the stair enclosure to the outside or to the level of exit discharge, and any exit passageway and its associated doors, if such are provided, so as to discharge the stair directly to the outside. In the case of a door leading directly from the street floor to the street or open air, the exit comprises only the door. [101, 202118]

Doors of small individual rooms, as in hotels, while constituting exit access from the room, are not referred to as exits, except where they lead directly to the outside of the building from the street floor. [101, 202118]

3.3.110.1 *Horizontal Exit.
A way of passage from one building to an area of refuge in another building on approximately the same level, or a way of passage through or around a fire barrier to an area of refuge on approximately the same level in the same building that affords safety from fire and smoke originating from the area of incidence and areas communicating therewith. [101, 202118]

A.3.3.110.1 Horizontal Exit.
Horizontal exits should not be confused with egress through doors in smoke barriers. Doors in smoke barriers are designed only for temporary protection against smoke, whereas horizontal exits provide protection against serious fire for a relatively long period of time in addition to providing immediate protection from smoke. (See 7.2.4 of NFPA 101.) [101, 202118]

3.3.111 Exit Access.
That portion of a means of egress that leads to an exit. [101, 202118]

3.3.112 Exit Discharge.
That portion of a means of egress between the termination of an exit and a public way. [101, 202118]

3.3.119* Festival Seating.
A form of audience/spectator accommodation in which no seating, other than a floor or finished ground level, is provided for the audience/spectators gathered to observe a performance. [101, 202118]
A.3.3.119 Festival Seating.
Festival seating describes situations in assembly occupancies where live entertainment events are held that are expected to result in overcrowding and high audience density that can compromise public safety. It is not the intent to apply the term festival seating to exhibitions; sports events; conventions; and bona fide political, religious, and educational events. Assembly occupancies with 15 ft\(^2\) (1.4 m\(^2\)) or more per person should not be considered festival seating. [101, 2021]

3.3.121.1 Interior Ceiling Finish.
The interior finish of ceilings. [101, 2021]

3.3.121.2 *Interior Finish.
The exposed surfaces of walls, ceilings, and floors within buildings. [101, 2021]

A.3.3.121.2 Interior Finish.
Interior finish is not intended to apply to surfaces within spaces such as those that are concealed or inaccessible. Furnishings that, in some cases, might be secured in place for functional reasons should not be considered as interior finish. [101, 2021]

3.3.121.3 *Interior Floor Finish.
The interior finish of floors, ramps, stair treads and risers, and other walking surfaces. [101, 2021]

A.3.3.121.3 Interior Floor Finish.
Interior floor finish includes coverings applied over a normal finished floor or stair treads and risers. [101, 2021]

3.3.121.4 *Interior Wall Finish.
The interior finish of columns, fixed or movable walls, and fixed or movable partitions. [101, 2021]

A.3.3.121.4 Interior Wall Finish.
Such partitions are intended to include washroom water closet partitions. [101, 2021]

3.3.136 *Flame Spread.
The propagation of flame over a surface. [101, 2021]

A.3.3.136 Flame Spread.
See Section 10.2 of NFPA 101. [101, 2021]

3.3.137 Flame Spread Index.
A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Burning Building Materials. [101, 2021]
A.3.3.136 Flame Spread.
See Section 10.2 of NFPA 101. [101, 2018]

A.3.3.152.2 Low Hazard Contents.
Chapter 42 of NFPA 101 recognizes storage of noncombustible materials as low hazard. In other occupancies, it is assumed that, even where the actual contents hazard is normally low, there is sufficient likelihood that some combustible materials or hazardous operations will be introduced in connection with building repair or maintenance, or some psychological factor might create conditions conducive to panic, so that the egress facilities cannot safely be reduced below those specified for ordinary hazard contents. [101:A.6.2.2.2, 2018]

A.3.3.152.3 Ordinary Hazard Contents.
Ordinary hazard classification represents the conditions found in most buildings and is the basis for the general requirements of NFPA 101. [101:A.6.2.2.3, 2018]

The fear of poisonous fumes or explosions is necessarily a relative matter to be determined on a judgment basis. All smoke contains some toxic fire gases but, under conditions of ordinary hazard, there should be no unduly dangerous exposure during the period necessary to escape from the fire area, assuming there are proper exits. [101:A.6.2.3, 2018]

3.3.186 *Means of Egress.
A continuous and unobstructed way of travel from any point in a building or structure to a public way consisting of three separate and distinct parts: (1) the exit access, (2) the exit, and (3) the exit discharge. [101, 2021]

A.3.3.186 Means of Egress.
A means of egress comprises the vertical and horizontal travel and includes intervening room spaces, doorways, hallways, corridors, passageways, balconies, ramps, stairs, elevators, enclosures, lobbies, escalators, horizontal exits, courts, and yards. [101, 2021]

3.3.187 Means of Escape.
A way out of a building or structure that does not conform to the strict definition of means of egress but does provide an alternate way out. [101, 2021]

3.3.188 Mezzanine.
An intermediate level between the floor and the ceiling of any room or space. [101, 2021]

3.3.196.1 *Ambulatory Health Care Occupancy.
An occupancy used to provide services or treatment simultaneously to four or more patients that provides, on an outpatient basis, one or more of the following: (1) treatment for patients that renders the patients incapable of taking action for self-preservation under emergency conditions without the
assistance of others; (2) anesthesia that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others; (3) treatment for patients who, due to the nature of their injury or illness, are incapable of taking action for self-preservation under emergency conditions without the assistance of others. [101, 202118]

A.3.3.196.1 Ambulatory Health Care Occupancy.
It is not the intent that occupants be considered to be incapable of self-preservation just because they are in a wheelchair or use assistive walking devices, such as a cane, a walker, or crutches. Rather it is the intent to address treatment centers that receive patients who have been rendered incapable of self-preservation, such as being rendered unconscious as a result of an accident or being unable to move due to sudden illness. [101, 202118]

It is not the intent that the term anesthesia be limited to general anesthesia. [101, 202118]

3.3.196.2 *Apartment Building.
A building or portion thereof containing three or more dwelling units with independent cooking and bathroom facilities. [101, 202118]

A.3.3.196.2 Apartment Building.
The Code specifies that, wherever there are three or more living units in a building, the building is considered an apartment building and is required to comply with Chapter 30 or Chapter 31 of NFPA 101, as appropriate. Townhouse units are considered to be apartment buildings if there are three or more units in the building. The type of wall required between units in order to consider them to be separate buildings is normally established by the AHJ. If the units are separated by a wall of sufficient fire resistance and structural integrity to be considered as separate buildings, then the provisions of Chapter 24 of NFPA 101, apply to each townhouse. Condominium status is a form of ownership, not occupancy; for example, there are condominium warehouses, condominium apartments, and condominium offices. [101, 202118]

3.3.196.3 *Assembly Occupancy.
An occupancy (1) used for a gathering of 50 or more persons for deliberation, worship, entertainment, eating, drinking, amusement, awaiting transportation, or similar uses; or (2) used as a special amusement building, regardless of occupant load. [101, 202118]

A.3.3.196.3 Assembly Occupancy.
Assembly occupancies might include the following:

- Armories
- Assembly halls
- Auditoriums
- Bowling lanes
- Club rooms
- College and university classrooms, 50 persons and over
- Conference rooms
- Courtrooms
(9) Dance halls
(10) Drinking establishments
(11) Exhibition halls
(12) Gymnasiums
(13) Libraries
(14) Mortuary chapels
(15) Motion picture theaters
(16) Museums
(17) Passenger stations and terminals of air, surface, underground, and marine public transportation facilities
(18) Places of religious worship
(19) Pool rooms
(20) Recreation piers
(21) Restaurants
(22) Skating rinks
(23) Special amusement buildings, regardless of occupant load
(24) Theaters

[101, 202118]

Assembly occupancies are characterized by the presence or potential presence of crowds with attendant panic hazard in case of fire or other emergency. They are generally open or occasionally open to the public, and the occupants, who are present voluntarily, are not ordinarily subject to discipline or control. Such buildings are ordinarily occupied by able-bodied persons and are not used for sleeping purposes. Special conference rooms, snack areas, and other areas incidental to, and under the control of, the management of other occupancies, such as offices, fall under the 50-person limitation. [101, 202118]

Restaurants and drinking establishments with an occupant load of fewer than 50 persons should be classified as mercantile occupancies. [101, 202118]

For special amusement buildings, see 12.4.98 and 13.4.98 of NFPA 101. [101, 202118]

3.3.196.4 Bulk Merchandising Retail Building.
A building in which the sales area includes the storage of combustible materials on pallets, in solid piles, or in racks in excess of 12 ft (3660 mm) in storage height. [101, 202118]

3.3.196.5 *Business Occupancy.
An occupancy used for the transaction of business other than mercantile. [101, 202118]

A.3.3.196.5 Business Occupancy.
Business occupancies include the following:

(1) Airport traffic control towers (ATCTs)
(2) City halls
(3) College and university instructional buildings, classrooms under 50 persons, and instructional laboratories
Courthouses
Dentists’ offices
Doctors’ offices
General offices
Outpatient clinics (ambulatory)
Town halls

Doctors’ and dentists’ offices are included, unless of such character as to be classified as ambulatory health care occupancies. (See 3.3.196.1.)

Birth centers should be classified as business occupancies if they are occupied by fewer than four patients, not including infants, at any one time; do not provide sleeping facilities for four or more occupants; and do not provide treatment procedures that render four or more patients, not including infants, incapable of self-preservation at any one time. For birth centers occupied by patients not meeting these parameters, see Chapter 18 or Chapter 19 of NFPA 101, as appropriate.

Service facilities common to city office buildings such as newsstands, lunch counters serving fewer than 50 persons, barber shops, and beauty parlors are included in the business occupancy group.

City halls, town halls, and courthouses are included in the business occupancy group insofar as their principal function is the transaction of public business and the keeping of books and records. Insofar as they are used for assembly purposes, they are classified as assembly occupancies.

3.3.196.6 *Day-Care Home.
A building or portion of a building in which more than 3 but not more than 12 clients receive care, maintenance, and supervision, by other than their relative(s) or legal guardian(s), for less than 24 hours per day.

A.3.3.196.6 Day-Care Home.
A day-care home is generally located within a dwelling unit.

3.3.196.7 *Day-Care Occupancy.
An occupancy in which four or more clients receive care, maintenance, and supervision, by other than their relatives or legal guardians, for less than 24 hours per day.

A.3.3.196.7 Day-Care Occupancy.
Day-care occupancies include the following:

1. Adult day-care occupancies, except where part of a health care occupancy
2. Child day-care occupancies
3. Day-care homes
(4) Kindergarten classes that are incidental to a child day-care occupancy
(5) Nursery schools

In areas where public schools offer only half-day kindergarten programs, many child day-care occupancies offer state-approved kindergarten classes for children who need full-day care. Because these classes are normally incidental to the day-care occupancy, the requirements of the day-care occupancy should be followed. [101, 2021]

3.3.196.8 *Detention and Correctional Occupancy.*

An occupancy, other than one whose primary intended use is health care, ambulatory health care, or residential board and care, used to lawfully incarcerate or lawfully detain one or more persons under varied degrees of restraint or security where such occupants are mostly incapable of self-preservation because of security measures not under the occupants’ control. [101, 2021]

A.3.3.196.8 Detention and Correctional Occupancy.

Detention and correctional occupancies include the following:

(1) Adult and juvenile substance abuse centers
(2) Adult and juvenile work camps
(3) Adult community residential centers
(4) Adult correctional institutions
(5) Adult local detention facilities
(6) Juvenile community residential centers
(7) Juvenile detention facilities
(8) Juvenile training schools

Detention and correctional occupancies do not include psychiatric and dementia units in hospitals, emergency rooms in hospitals, ambulatory health care occupancies, nursing homes, and residential board and care occupancies where persons can be lawfully detained. [101, 2021]

See A.22.1.1.1.6 and A.23.1.1.1.6 of NFPA 101. [101, 2021] It is not the intent to classify as detention and correctional occupancies the areas of health care occupancies where doors are locked against patient egress where needed for the clinical needs of the patients. For example, a dementia treatment center can be adequately protected by the health care occupancies requirements of Chapter 19 of NFPA 101. [See 19.1.1.1, 19.2.2.2, 19.2.2.4(1), and 19.2.2.2.6 of NFPA 101.] [101, 2018]

The one-resident threshold requirement of 23.1.1.1.6 of NFPA 101 is not meant to force a residential occupancy, where security is imposed on one or more occupants, to be reclassified as a detention and correctional occupancy. [101, 2018]

3.3.196.8.1.1 Use Condition I — Free Egress.
A condition under which free movement is allowed from sleeping areas and other spaces where access or occupancy is permitted to the exterior via means of egress that meet the requirements of NFPA 101.

3.3.196.8.1.2 Use Condition II — Zoned Egress.
A condition under which free movement is allowed from sleeping areas and any other occupied smoke compartment to one or more other smoke compartments. [101, 22.1.2.1.202118]

3.3.196.8.1.3 Use Condition III — Zoned Impeded Egress.
A condition under which free movement is allowed within individual smoke compartments, such as within a residential unit comprised of individual sleeping rooms and a group activity space, with egress impeded by remote-controlled release of means of egress from such a smoke compartment to another smoke compartment. [101, 22.1.2.1.3202118]

3.3.196.8.1.4 Use Condition IV — Impeded Egress.
A condition under which free movement is restricted from an occupied space, and remote-controlled release is provided to allow movement from all sleeping rooms, activity spaces, and other occupied areas within the smoke compartment to another smoke compartment. [101, 22.1.2.1.4202118]

3.3.196.8.1.5 Use Condition V — Contained.
A condition under which free movement is restricted from an occupied space, and staff-controlled manual release at each door is provided to allow movement from all sleeping rooms, activity spaces, and other occupied areas within the smoke compartment to another smoke compartment. [101, 22.1.2.1.5202118]

3.3.196.9 *Dormitory.
A building or a space in a building in which group sleeping accommodations are provided for more than 16 persons who are not members of the same family in one room, or a series of closely associated rooms under joint occupancy and single management, with or without meals, but without individual cooking facilities. [101, 202118]

A.3.3.196.9 Dormitory.
Rooms within dormitories intended for the use of individuals for combined living and sleeping purposes are guest rooms or guest suites. Examples of dormitories are college dormitories, fraternity and sorority houses, and military barracks. [101, 202148]

3.3.196.10 *Educational Occupancy.
An occupancy used for educational purposes through the twelfth grade by six or more persons for 4 or more hours per day or more than 12 hours per week. [101, 202118]

A.3.3.196.10 Educational Occupancy.
Educational occupancies include the following:
An educational occupancy is distinguished from an assembly occupancy in that the same occupants are regularly present. [101, 2018]

3.3.196.11 *Health Care Occupancy.
An occupancy used to provide medical or other treatment or care simultaneously to four or more patients on an inpatient basis, where such patients are mostly incapable of self-preservation due to age, physical or mental disability, or because of security measures not under the occupants' control. [101, 2018]

A.3.3.196.11 Health Care Occupancy.
Health care occupancies include the following:

(1) Hospitals
(2) Limited care facilities
(3) Nursing homes

[101, 2018]

Occupants of health care occupancies typically have physical or mental illness, disease, or infirmity. They also include infants, convalescents, or infirm aged persons. It is not the intent to consider occupants incapable of self-preservation because they are in a wheelchair or use assistive walking devices, such as a cane, a walker, or crutches. [101, 2018]

A.3.3.196.13 Hospital.
A building or portion thereof used on a 24-hour basis for the medical, psychiatric, obstetrical, or surgical care of four or more inpatients. [101, 2018]

3.3.196.14 *Hotel.
A building or groups of buildings under the same management in which there are sleeping accommodations for more than 16 persons and primarily used by transients for lodging with or without meals. [101, 2018]

A.3.3.196.14 Hotel.
So-called apartment hotels should be classified as hotels, because they are potentially subject to the
same transient occupancy as hotels. Transients are those who occupy accommodations for less than 30 days. [101, 202118]

3.3.196.15 *Industrial Occupancy.
An occupancy in which products are manufactured or in which processing, assembling, mixing, packaging, finishing, decorating, or repair operations are conducted. [101, 202118]

A.3.3.196.15 Industrial Occupancy.
Industrial occupancies include the following:

(1) Drycleaning plants
(2) Factories of all kinds
(3) Food processing plants
(4) Gas plants
(5) Hangars (for servicing/maintenance)
(6) Laundries
(7) Power plants
(8) Pumping stations
(9) Refineries
(10) Sawmills
(11) Telephone exchanges

[101, 202118]

In evaluating the appropriate classification of laboratories, the AHJ should treat each case individually, based on the extent and nature of the associated hazards. Some laboratories are classified as occupancies other than industrial; for example, a physical therapy laboratory or a computer laboratory. [101, 202118]

For laboratories within the scope of NFPA 45, the occupancies are defined in NFPA 45, Section 3.3, as follows:

(1) Noninstructional labs are considered industrial.
(2) Labs within the scope of NFPA 99 are considered health care.
(3) Instructional labs for grades 12 and below are considered educational.
(4) Labs for grades above grade 12 and Class D labs are business occupancies.

[5000, 2018]

3.3.196.16 *Limited Care Facility.
A building or portion of a building used on a 24-hour basis for the housing of four or more persons who are incapable of self-preservation because of age; physical limitations due to accident or illness; or limitations such as mental retardation/ intellectual disability/developmental disability, mental illness, or chemical dependency. [101, 202118]
A.3.3.196.16 Limited Care Facility.

Limited care facilities and residential board and care occupancies both provide care to people with physical and mental limitations. However, the goals and programs of the two types of occupancies differ greatly. The requirements in NFPA 101 for limited care facilities are based on the assumption that these are medical facilities, that they provide medical care and treatment, and that the patients are not trained to respond to the fire alarm; that is, the patients do not participate in fire drills but, rather, await rescue. (See Section 18.7 of NFPA 101.) [101, 2021]

The requirements for residential board and care occupancies are based on the assumption that the residents are provided with personal care and activities that foster continued independence, that the residents are encouraged and taught to overcome their limitations, and that most residents, including all residents in prompt and slow homes, are trained to respond to fire drills to the extent they are able. Residents are required to participate in fire drills. (See Section 32.7 of NFPA 101.) [101, 2021]

Persons with Alzheimer’s and related illnesses might be located in a nursing home, limited care facility, or board and care facility. For such persons, it is the level of care provided, not the medical diagnosis, that matters for the purposes of determining whether the facility should meet the requirements for limited care. Where personal care is provided but medical or custodial care is not, the limited care definition does not typically apply. It is the intent of this definition that it not apply to persons not receiving medical or custodial care, provided they are able to assist in their own evacuation, regardless of their medical diagnosis. [101, 2021]

3.3.196.17 Lodging or Rooming House.

A building or portion thereof that does not qualify as a one- or two-family dwelling, that provides sleeping accommodations for a total of 16 or fewer people on a transient or permanent basis, without personal care services, with or without meals, but without separate cooking facilities for individual occupants. [101, 2021]

3.3.196.19 *Mercantile Occupancy.

An occupancy used for the display and sale of merchandise. [101, 2021]

A.3.3.196.19 Mercantile Occupancy.

Mercantile occupancies include the following:

(1) Auction rooms
(2) Department stores
(3) Drugstores
(4) Restaurants with fewer than 50 persons
(5) Shopping centers
(6) Supermarkets

[101, 2021]

Office, storage, and service facilities incidental to the sale of merchandise and located in the same
building should be considered part of the mercantile occupancy classification.

3.3.196.19.1 Class A Mercantile Occupancy.
All mercantile occupancies having an aggregate gross area of more than 30,000 ft\(^2\) (2800 m\(^2\)) or occupying more than three stories for sales purposes. [101, 202118]

3.3.196.19.2 Class B Mercantile Occupancy.
All mercantile occupancies of more than 3000 ft\(^2\) (280 m\(^2\)), but not more than 30,000 ft\(^2\) (2800 m\(^2\)), aggregate gross area and occupying not more than three stories for sales purposes. Class B also includes all mercantile occupancies of not more than 3000 ft\(^2\) (280 m\(^2\)) gross area and occupying two or three stories for sales purposes. [101, 202118]

3.3.196.19.3 Class C Mercantile Occupancy.
All mercantile occupancies of not more than 3000 ft\(^2\) (280 m\(^2\)) gross area and used for sales purposes occupying one story only, excluding mezzanines. [101, 202118]

3.3.196.20 Mixed Occupancy.
A multiple occupancy where the occupancies are intermingled. [101, 202118]

3.3.196.23 Multiple Occupancy.
A building or structure in which two or more classes of occupancy exist. [101, 202118]

3.3.196.24 Nursing Home.
A building or portion of a building used on a 24-hour basis for the housing and nursing care of four or more persons who, because of mental or physical incapacity, might be unable to provide for their own needs and safety without the assistance of another person. [101, 202118]

3.3.196.25.1 One- and Two-Family Dwelling Unit.
A building that contains not more than two dwelling units, each dwelling unit occupied by members of a single family with not more than three outsiders, if any, accommodated in rented rooms, with independent cooking and bathroom facilities. [101, 202118]

3.3.196.28 *Residential Board and Care Occupancy.
An occupancy used for lodging and boarding of four or more residents, not related by blood or marriage to the owners or operators, for the purpose of providing personal care services. [101, 202118]

A.3.3.196.28 Residential Board and Care Occupancy.
The following are examples of facilities that are classified as residential board and care occupancies:
(1) Group housing arrangement for physically or mentally handicapped persons who normally attend school in the community, attend worship in the community, or otherwise use community facilities
(2) Group housing arrangement for physically or mentally handicapped persons who are undergoing training in preparation for independent living, for paid employment, or for other normal community activities
(3) Group housing arrangement for the elderly that provides personal care services but that does not provide nursing care
(4) Facilities for social rehabilitation, alcoholism, drug abuse, or mental health problems that contain a group housing arrangement and that provide personal care services but do not provide acute care
(5) Assisted living facilities
(6) Other group housing arrangements that provide personal care services but not nursing care

[101, 202118]

3.3.196.29 *Residential Occupancy.
An occupancy that provides sleeping accommodations for purposes other than health care or detention and correctional. [101, 202118]

A.3.3.196.29 Residential Occupancy.
Residential occupancies are treated as separate occupancies in this Code as follows:

(1) One- and two-family dwellings (Chapter 24 of NFPA 101)
(2) Lodging or rooming houses (Chapter 26 of NFPA 101)
(3) Hotels, motels, and dormitories (Chapters 28 and 29 of NFPA 101)
(4) Apartment buildings (Chapters 30 and 31 of NFPA 101)

[101, 202118]

3.3.196.30 Separated Occupancy.
A multiple occupancy where the occupancies are separated by fire resistance–rated assemblies. [101, 202118]

3.3.196.31 *Storage Occupancy.
An occupancy used primarily for the storage or sheltering of goods, merchandise, products, or vehicles. [101, 202118]

A.3.3.196.31 Storage Occupancy.
Storage occupancies include the following:

(1) Barns
(2) Bulk oil storage
(3) Cold storage
(4) Freight terminals
(5) Grain elevators
Hangars (for storage only)
Parking structures
Truck and marine terminals
Warehouses

Storage occupancies are characterized by the presence of relatively small numbers of persons in proportion to the area.

3.3.197 Occupant Load.
The total number of persons that might occupy a building or portion thereof at any one time. [101, 202118]

3.3.213 *Personal Care.
The care of residents who do not require chronic or convalescent medical or continuous skilled nursing care. [101, 202118]

A.3.3.213 Personal Care.
Personal care involves responsibility for the safety of the resident while inside the building. Personal care might include daily awareness by management of the resident's functioning and whereabouts, making and reminding a resident of appointments, the ability and readiness for intervention in the event of a resident experiencing a crisis, supervision in the areas of nutrition and medication, and actual provision of transient medical care, including limited periodic skilled nursing care. [101, 202118]

3.3.224 Public Way.
A street, alley, or other similar parcel of land essentially open to the outside air deeded, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width and height of not less than 10 ft (3050 mm). [101, 202118]

3.3.230 *Ramp.
A walking surface that has a slope steeper than 1 in 20. [101, 202118]

A.3.3.230 Ramp.
See 7.2.5 of NFPA 101. [101, 202118]

3.3.244 Self-Closing.
Equipped with an approved device that ensures closing after opening. [101, 202118]

3.3.252 *Smoke Partition.
A continuous membrane that is designed to form a barrier to limit the transfer of smoke. [101, 202118]
A.3.3.252 Smoke Partition.
A smoke partition is not required to have a fire resistance rating. [101, 2021]

3.3.267.1 Occupiable Story.
A story occupied by people on a regular basis. [101, 2021]

3.3.268 Street.
A public thoroughfare that has been dedicated for vehicular use by the public and can be used for access by fire department vehicles. [101, 2021]

3.3.269 Street Floor.
A story or floor level accessible from the street or from outside the building at the finished ground level, with the floor level at the main entrance located not more than three risers above or below the finished ground level, and arranged and utilized to qualify as the main floor. [101, 2021]

A.3.3.269 Street Floor.
Where, due to differences in street levels, there are two or more stories are accessible from the street, each is a street floor. Where there is no floor level within the specified limits for a street floor above or below ground level, the building has no street floor. [101, 2021]

3.3.271 Structure.
That which is built or constructed. [101, 2021]

A.3.3.271 Structure.
The term structure is to be understood as if followed by the words or portion thereof. (See also 3.3.30, Building.) [101, 2021]

3.3.271.1 Open Structure.
A structure that supports equipment and operations not enclosed within building walls. [101, 2021]

A.3.3.271.1 Open Structure.
Open structures are often found in oil refining, chemical processing, or power plants. Roofs or canopies without enclosing walls are not considered an enclosure. [101, 2021]

3.4.1 Alternative Calculation Procedure.
A calculation procedure that differs from the procedure originally employed by the design team but that provides predictions for the same variables of interest. [101, 2021]

3.4.3 Data Conversion.
The process of developing the input data set for the assessment method of choice. [101, 2021]
3.4.6 Design Team.
A group of stakeholders including, but not limited to, representatives of the architect, client, and any pertinent engineers and other designers. [101, 202118]

3.4.7 *Exposure Fire.
A fire that starts at a location that is remote from the area being protected and grows to expose that which is being protected. [101, 202118]

A.3.4.7 Exposure Fire.
An exposure fire usually refers to a fire that starts outside a building, such as a wildlands fire or vehicle fire, and that, consequently, exposes the building to a fire. [101, 202118]

3.4.8 *Fire Model.
Mathematical prediction of fire growth, environmental conditions, and potential effects on structures, systems, or components based on the conservation equations or empirical data. [805, 202015]

A.3.4.8 Fire Model.
Due to the complex nature of the principles involved, models are often packaged as computer software. Any relevant input data, assumptions, and limitations needed to properly implement the model will be attached to the fire models. [101, 202118]

3.4.9 *Fire Scenario.
A set of conditions that defines the development of fire, the spread of combustion products throughout a building or portion of a building, the reactions of people to fire, and the effects of combustion products. [101, 202118]

A.3.4.9 Fire Scenario.
A fire scenario defines the conditions under which a proposed design is expected to meet the fire safety goals. Factors typically include fuel characteristics, ignition sources, ventilation, building characteristics, and occupant locations and characteristics. The term fire scenario includes more than the characteristics of the fire itself but excludes design specifications and any characteristics that do not vary from one fire to another; the latter are called assumptions. The term fire scenario is used here to mean only those specifications required to calculate the fire's development and effects, but, in other contexts, the term might be used to mean both the initial specifications and the subsequent development and effects (i.e., a complete description of fire from conditions prior to ignition to conditions following extinguishment). [101, 202118]

3.4.9.1 Design Fire Scenario.
A fire scenario selected for evaluation of a proposed design. [101, 202118]

3.4.11 Incapacitation.
A condition under which humans do not function adequately and become unable to escape untenable
3.4.12 Input Data Specification.
Information required by the verification method. [101, 201821]

3.4.13 Occupant Characteristics.
The abilities or behaviors of people before and during a fire. [101, 201821]

3.4.14 *Performance Criteria.
Threshold values on measurement scales that are based on quantified performance objectives. [101, 201821]

A.3.4.14 Performance Criteria.
Performance criteria are stated in engineering terms. Engineering terms include temperatures, radiant heat flux, and levels of exposure to fire products. Performance criteria provide threshold values used to evaluate a proposed design. [101, 201821]

3.4.15 *Proposed Design.
A design developed by a design team and submitted to the AHJ for approval. [101, 201821]

A.3.4.15 Proposed Design.
The design team might develop a number of trial designs that will be evaluated to determine whether they meet the performance criteria. One of the trial designs will be selected from those that meet the performance criteria for submission to the AHJ as the proposed design. [101, 201821]

The proposed design is not necessarily limited to fire protection systems and building features. It also includes any component of the proposed design that is installed, established, or maintained for the purpose of life safety, without which the proposed design could fail to achieve specified performance criteria. Therefore, the proposed design often includes emergency procedures and organizational structures that are needed to meet the performance criteria specified for the proposed design. [101, 201821]

3.4.16 Safe Location.
A location remote or separated from the effects of a fire so that such effects no longer pose a threat. [101, 201821]

3.4.17 Safety Factor.
A factor applied to a predicted value to ensure that a sufficient safety margin is maintained. [101, 201821]

3.4.18 Safety Margin.
The difference between a predicted value and the actual value where a fault condition is expected. [101, 201821]

3.4.20 Stakeholder.
An individual, or representative of same, having an interest in the successful completion of a project. [101, 201821]

3.4.22 Verification Method.
A procedure or process used to demonstrate or confirm that the proposed design meets the specified criteria. [101, 201821]

A.4.5.8.3
Examples of such features include automatic sprinklers, fire alarm systems, standpipes, and portable fire extinguishers. The presence of a life safety feature, such as sprinklers or fire alarm devices, creates a reasonable expectation by the public that these safety features are functional. When systems are inoperable or taken out of service but the devices remain, they present a false sense of safety. Also, before taking any life safety features out of service, extreme care needs to be exercised to ensure that the feature is not required, was not originally provided as an alternative or equivalent, or is no longer required due to other new requirements in the current Code. It is not intended that the entire system or protection feature be removed. Instead, components such as sprinklers, initiating devices, notification appliances, standpipe hose, and exit systems should be removed to reduce the likelihood of relying on inoperable systems or features. Conversely, equipment, such as fire or smoke dampers, that is not obvious to the public should be able to be taken out of service if no longer required by this Code. Where a door that is not required to be fire protection-rated is equipped with a fire protection listing label, it is not the intent of 4.5.8.3 to require such door to be self- or automatic-closing due merely to the presence of the label. [101:A.4.6.12.3]

4.5.8.6
Any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature requiring periodic testing, inspection, or operation to ensure its maintenance shall be tested, inspected, or operated as specified elsewhere in this Code or as directed by the AHJ. [101:4.6.12.54]

4.5.8.7
Maintenance, inspection, and testing shall be performed under the supervision of a responsible person who shall ensure that testing, inspection, and maintenance are made at specified intervals in accordance with applicable NFPA standards or as directed by the AHJ. [101:4.6.12.65]

A.6.1.2.1
Assembly Occupancy. Assembly occupancies might include the following:

1. Armories
2. Assembly halls
3. Auditoriums
<table>
<thead>
<tr>
<th></th>
<th>Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Bowling lanes</td>
</tr>
<tr>
<td>5</td>
<td>Club rooms</td>
</tr>
<tr>
<td>6</td>
<td>College and university classrooms, 50 persons and over</td>
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<td>7</td>
<td>Conference rooms</td>
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<tr>
<td>8</td>
<td>Courtrooms</td>
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<td>9</td>
<td>Dance halls</td>
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<tr>
<td>10</td>
<td>Drinking establishments</td>
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<tr>
<td>11</td>
<td>Exhibition halls</td>
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<tr>
<td>12</td>
<td>Gymnasiums</td>
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<tr>
<td>13</td>
<td>Libraries</td>
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<tr>
<td>14</td>
<td>Mortuary chapels</td>
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<tr>
<td>15</td>
<td>Motion picture theaters</td>
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<tr>
<td>16</td>
<td>Museums</td>
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<tr>
<td>17</td>
<td>Passenger stations and terminals of air, surface, underground, and marine public transportation facilities</td>
</tr>
<tr>
<td>18</td>
<td>Places of religious worship</td>
</tr>
<tr>
<td>19</td>
<td>Pool rooms</td>
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<tr>
<td>20</td>
<td>Recreation piers</td>
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<tr>
<td>21</td>
<td>Restaurants</td>
</tr>
<tr>
<td>22</td>
<td>Skating rinks</td>
</tr>
<tr>
<td>23</td>
<td>Special amusement buildings, regardless of occupant load</td>
</tr>
<tr>
<td>24</td>
<td>Theaters</td>
</tr>
</tbody>
</table>

Assembly occupancies are characterized by the presence or potential presence of crowds with attendant panic hazard in case of fire or other emergency. They are generally or occasionally open to the public, and the occupants, who are present voluntarily, are not ordinarily subject to discipline or control. Such buildings are ordinarily not used for sleeping purposes. Special conference rooms, snack areas, and other areas incidental to, and under the control of, the management of other occupancies, such as offices, fall under the 50-person limitation. [101:A.6.1.2.1]

Restaurants and drinking establishments with an occupant load of fewer than 50 persons should be classified as mercantile occupancies. [101:A.6.1.2.1]

Occupancy of any room or space for assembly purposes by fewer than 50 persons in another occupancy, and incidental to such other occupancy, should be classified as part of the other occupancy and should be subject to the provisions applicable thereto. [101:A.6.1.2.1]

For special amusement buildings, see 12.4.97 and 13.4.97 of NFPA 101. [101:A.6.1.2.1]

### 6.1.4.1 *Definition — Day-Care Occupancy.*
An occupancy in which four or more clients receive care, maintenance, and supervision, by other than their relatives or legal guardians, for less than 24 hours per day. [101:6.1.4.1]
A.6.1.4.1

Day-Care Occupancy. Day-care occupancies include the following:

1. Adult day-care occupancies, except where part of a health care occupancy
2. Child day-care occupancies
3. Day-care homes
4. Kindergarten classes that are incidental to a child day-care occupancy
5. Nursery schools

[101:A.6.1.4.1]

In areas where public schools offer only half-day kindergarten programs, many child day-care occupancies offer state-approved kindergarten classes for children who need full-day care. Because these classes are normally incidental to the day-care occupancy, the requirements of the day-care occupancy should be followed. [101:A.6.1.4.1]

6.1.7.1 *Definition — Detention and Correctional Occupancy.

An occupancy, other than one whose primary intended use is health care, ambulatory health care, or residential board and care, used to lawfully incarcerate or lawfully detain one or more persons under varied degrees of restraint or security where such occupants are mostly incapable of self-preservation because of security measures not under the occupants’ control. An occupancy used to house one or more persons under varied degrees of restraint or security where such occupants are mostly incapable of self-preservation because of security measures not under the occupants’ control. [101:6.1.7.1]

A.6.1.7.1

Detention and Correctional Occupancy. Detention and correctional occupancies include the following:

1. Adult and juvenile substance abuse centers
2. Adult and juvenile work camps
3. Adult community residential centers
4. Adult correctional institutions
5. Adult local detention facilities
6. Juvenile community residential centers
7. Juvenile detention facilities
8. Juvenile training schools

[101:A.6.1.7.1]

Detention and correctional occupancies do not include psychiatric and dementia units in hospitals, emergency rooms in hospitals, ambulatory health care occupancies, nursing homes, and residential board and care occupancies where persons can be lawfully detained. [101:A.6.1.7.1]

See A.22.1.1.1.6 and A.23.1.1.1.6 of NFPA 101. [101:A.6.1.7.1]

6.1.7.2 *Nonresidential Uses.

Within detention and correctional facilities, uses other than residential housing shall be in accordance
with the appropriate chapter of this Code and NFPA 101. *(See 22.1.32.3 and 23.1.32.3 of NFPA 101.)*

**A.6.1.11.1**

**Business Occupancy.** Business occupancies include the following:

1. Airport traffic control towers (ATCTs)
2. City halls
3. College and university instructional buildings, classrooms under 50 persons, and instructional laboratories
4. Courthouses
5. Dentists’ offices
6. Doctors’ offices
7. General offices
8. Outpatient clinics (ambulatory)
9. Town halls

*(101:A.6.1.11.1)*

Doctors’ and dentists’ offices are included, unless of such character as to be classified as ambulatory health care occupancies. *(See 3.3.1988.1 of NFPA 101.)* *(101:A.6.1.11.1)*

Birth centers should be classified as business occupancies if they are occupied by fewer than four patients, not including infants, at any one time; do not provide sleeping facilities for four or more occupants; and do not provide treatment procedures that render four or more patients, not including infants, incapable of self-preservation at any one time. For birth centers occupied by patients not meeting these parameters, see Chapter 18 or Chapter 19 of NFPA 101, as appropriate. *(101:A.6.1.11.1)*

Service facilities common to city office buildings, such as newsstands, lunch counters serving fewer than 50 persons, barber shops, and beauty parlors are included in the business occupancy group. *(101:A.6.1.11.1)*

City halls, town halls, and courthouses are included in this occupancy group, insofar as their principal function is the transaction of public business and the keeping of books and records. Insofar as they are used for assembly purposes, they are classified as assembly occupancies. *(101:A.6.1.11.1)*

**6.1.14.1.1**

Multiple occupancies shall comply with the requirements of 6.1.14.1 and one of the following:

2. Separated occupancies — 6.1.14.4

*(101:6.1.14.1.1)*

**A.6.1.14.1.1**

Where a building is subdivided for occupancy by multiple tenants, the presence of rated fire barriers
between occupancies and independent exit access for each occupancy does not mandate the use of the separated occupancy provisions of 6.1.14.4. [101:A.6.1.14.1.1]

6.1.14.3.2*
The building shall comply with the most restrictive requirements of the occupancies involved, unless separate safeguards are approved. [101:6.1.14.3.2]

A.6.1.14.3.2
For example, a common path of travel that occurs wholly in a business tenant space, in a multiple occupancy building containing assembly and business occupancies, should not have to meet the assembly occupancy common path of travel limitation. [101:A.6.1.14.3.2]

6.1.14.4.1
Where separated occupancies are provided, each part of the building comprising a distinct occupancy, as described in this chapter, shall be completely separated from other occupancies by fire-barriers, as specified in 6.1.14.4.2, 6.1.14.4.3, and Table 6.1.14.4.1(a) and Table 6.1.14.4.1(b), unless separation is provided by approved existing separations or as otherwise permitted by 6.1.14.4.6. [101:6.1.14.4.1]

Table 6.1.14.4.1(a) Required Separation of Occupancies (hours),** Part 1

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Assem bly ≤300</th>
<th>Assem bly &gt;300 to ≤100 0</th>
<th>Assem bly &gt;100 0</th>
<th>Educa tional</th>
<th>Day-Care &gt;12 C lients</th>
<th>Day-Care Ho mes</th>
<th>He alth Care</th>
<th>Ambu latory</th>
<th>Health Care</th>
<th>Deten tion &amp; Correc tional</th>
<th>One- &amp; Two-Fami ly Dwel lings</th>
<th>Lodging or Roo min g Hou ses</th>
<th>Hotels &amp; Dormitory</th>
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<td>Day-Care Homes</td>
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</table>

NP: Not permitted.

\[^{\dagger}\dagger\] Minimum Fire Resistance Rating. The fire resistance rating is permitted to be reduced by 1 hour, but in no case to less than 1 hour, where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13 and supervised in accordance with 13.3.1.8.

\[^{\dagger\dagger}\] The 1-hour reduction due to the presence of sprinklers in accordance with the single-dagger-asterisk footnote is not permitted.

[101:Table 6.1.14.4.1(a)]
Table 6.14.1(b) Required Separation of Occupancies (hours)*†, Part 2

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Apartment Buildings</th>
<th>Board &amp; Care, Small</th>
<th>Board &amp; Care, Large</th>
<th>Mercantile, Mall</th>
<th>Mercantile, Bulk Retail</th>
<th>Business</th>
<th>Industrial, General Purpose</th>
<th>Industrial, Special Purpose</th>
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<th>Storage, Low &amp; Ordinary Hazard</th>
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**High Hazard Storage, Low & Ordinary Hazard**

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</tbody>
</table>

NP: Not permitted.

*† Minimum Fire Resistance Rating. The fire resistance rating is permitted to be reduced by 1 hour, but in no case to less than 1 hour, where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13 and supervised in accordance with 13.3.1.8.

†‡ The 1-hour reduction due to the presence of sprinklers in accordance with the single-dagger-asterisk footnote is not permitted.

[101: Table 6.1.14.4.1(b)]

### 6.1.14.4.2

Occupancy separation fire barriers shall be classified as 3-hour fire-resistant-rated, 2-hour fire-resistant-rated, or 1-hour fire-resistant-rated and shall meet the requirements of Chapter 8 of NFPA 101. [101:6.1.14.4.2]

### 6.1.14.4.3

The fire barrier minimum fire resistance rating specified in Table 6.1.14.4.1(a) and Table 6.1.14.4.1(b) shall be permitted to be reduced by 1 hour, but in no case shall it be reduced to less than 1 hour, where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13 and supervised in accordance with 13.3.1.8, unless prohibited by the double-dagger footnote entries in the tables. [101:6.1.14.4.3]

### A.6.1.14.4.5

Where the Code text states that the provision has applicability to the building, rather than just to the occupancy, the provision applies to the entire building, regardless of whether the separated occupancies form of protection is used. For example, the provision of 18.3.5.1 of NFPA 101 requires that the entire building housing a health care occupancy be sprinklered. Contrast that with the requirement of 20.3.4.1 of NFPA 101, which requires an ambulatory health care facility, and not the entire building, to be provided with a fire alarm system. [101:A.6.1.14.4.5]

### 10.5.2 *Drill Frequency.*

Emergency egress and relocation drills, where required by Chapter 20 of this Code or Chapters 11 through 432 of NFPA 101, or the AHJ, shall be held with sufficient frequency to familiarize occupants...
with the drill procedure and to establish conduct of the drill as a matter of routine. Drills shall include suitable procedures to ensure that all persons subject to the drill participate. [101:4.7.2]

A.10.5.2
If an emergency egress and relocation drill is considered merely as a routine exercise from which some persons are allowed to be excused, there is a grave danger that, in an actual emergency, the evacuation and relocation will not be successful. However, there might be circumstances under which all occupants do not participate in an emergency egress and relocation drill for example, infirm or bedridden patients in a health care occupancy. [101:A.4.7.2]

A.10.8.2.1(3)
It is assumed that a majority of buildings will use a total evacuation strategy during a fire. It should be noted that evacuation from a building could occur for reasons other than a fire, but such other reasons are not the primary focus of the Code. As used herein, total evacuation is defined as the process in which all, or substantially all, occupants leave a building or facility in either an unmanaged or managed sequence or order. An alternative to total evacuation, is partial evacuation, which can be defined as the process in which a select portion of a building or facility is cleared or emptied of its occupants while occupants in other portions mostly carry on normal activity. In either case, the evacuation process can be ordered or managed in accordance with an established priority in which some or all occupants of a building or facility clear their area and utilize means of egress routes. This is typically done so that the more endangered occupants are removed before occupants in less endangered areas. Alternative terms describing this sequencing or ordering of evacuation are staged evacuation and phased evacuation. [101:A.4.8.2.1(3)]

Table A.10.8.2.1(3) illustrates options for extent of management and extent of evacuation. Some of the options shown might not be appropriate. As noted in Table A.10.8.2.1(3), either total or partial evacuation can include staged (zoned) evacuation or phased evacuation, which is referred to as managed or controlled evacuation. It should also be noted that the evacuation process might not include relocation to the outside of the building but might instead include relocation to an area of refuge or might defend the occupants in place to minimize the need for evacuation. [101:A.4.8.2.1(3)]

<table>
<thead>
<tr>
<th>Extent of Management</th>
<th>Extent of Evacuation</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Shelter in place</td>
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<td>No movement — shelter in place upon direction</td>
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<td></td>
<td>No movement — shelter in place per prior instruction</td>
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<tr>
<td></td>
<td>Managed or controlled partial evacuation</td>
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<td>In-building relocation on same floor</td>
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<tr>
<td></td>
<td>In-building relocation to different floors</td>
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<td></td>
<td>Occupants of some floors leave building</td>
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<td></td>
<td>Unmanaged movement</td>
</tr>
</tbody>
</table>

[Table A.10.8.2.1(3) Occupant Evacuation Strategies]
The different methods of evacuation are also used in several contexts throughout NFPA 101. Though most of the methods of evacuation are not specifically defined or do not have established criteria, various sections of NFPA 101 promulgate them as alternatives to total evacuation. The following sections of NFPA 101 discuss these alternatives in more detail:

1. Section 4.7 — Provides requirements for fire and relocation drills
2. 7.2.12 — Provides requirements for area of refuge
3. 7.2.4 — Provides requirements for horizontal exits
4. 9.6.3.76 — Provides the alarm signal requirements for different methods of evacuation
5. 9.6.3.109 — Permits automatically transmitted or live voice evacuation or relocation instructions to occupants and requires them in accordance with NFPA 72
6. 14.3.4.2.3 (also Chapter 15) — Describes alternative protection systems in educational occupancies
7. 18.1.1.2/18.1.1.3/Section 18.7 (also Chapter 19) — Provide methods of evacuation for health care occupancies
8. Chapters 22 and 23 — Provide methods of evacuation for detention and correctional occupancies, including the five groups of resident user categories
9. Chapters 32 and 33 — Provide methods of evacuation for residential board and care occupancies
10. 32.1.5/33.1.5 — For residential board and care occupancies, state that “no means of escape or means of egress shall be considered as complying with the minimum criteria for acceptance, unless emergency evacuation drills are regularly conducted”
11. 40.2.5.2.2 — For industrial occupancies, states that “ancillary facilities in special-purpose industrial occupancies where delayed evacuation is anticipated shall have not less than a 2-hour fire-resistant-rated separation from the predominant industrial occupancy and shall have one means of egress that is separated from the predominant industrial occupancy by 2-hour fire-resistant-rated construction”

The method of evacuation should be accomplished in the context of the physical facilities, the type of activities undertaken, and the provisions for the capabilities of occupants (and staff, if available). Therefore, in addition to meeting the requirements of the Code, or when establishing an equivalency or a performance-based design, the following recommendations and general guidance information should be taken into account when designing, selecting, executing, and maintaining a method of evacuation:

1. When choosing a method of evacuation, the available safe egress time (ASET) must always be greater than the required safe egress time (RSET).
2. The occupants’ characteristics will drive the method of evacuation. For example, occupants might be incapable of evacuating themselves because of age, physical or mental disabilities, physical restraint, or a combination thereof. However, some buildings might be staffed with people who could assist in evacuating. Therefore, the method of evacuation is dependent on
the ability of occupants to move as a group, with or without assistance. For more information, see the definitions under the term **Evacuation Capability** in Chapter 3 of NFPA 101.

(3) An alternative method of evacuation might or might not have a faster evacuation time than a total evacuation. However, the priority of evacuation should be such that the occupants in the most danger are given a higher priority. This prioritization will ensure that occupants more intimate with the fire will have a faster evacuation time.

(4) Design, construction, and compartmentation are also variables in choosing a method of evacuation. The design, construction, and compartmentation should limit the development and spread of a fire and smoke and reduce the need for occupant evacuation. The fire should be limited to the room or compartment of fire origin. Therefore, the following factors need to be considered:

(a) Overall fire resistance rating of the building
(b) Fire-rated compartmentation provided with the building
(c) Number and arrangement of the means of egress

(5) Fire safety systems should be installed that complement the method of evacuation and should include consideration of the following:

(a) Detection of fire
(b) Control of fire development
(c) Confinement of the effects of fire
(d) Extinguishment of fire
(e) Provision of refuge or evacuation facilities, or both

(6) One of the most important fire safety systems is the fire alarm and communication system, particularly the notification system. The fire alarm system should be in accordance with NFPA 72 and should take into account the following:

(a) Initial notification of only the occupants in the affected zone(s) (e.g., zone of fire origin and adjacent zones)
(b) Provisions to notify occupants in other unaffected zones to allow orderly evacuation of the entire building
(c) Need for live voice communication
(d) Reliability of the fire alarm and communication system

(7) The capabilities of the staff assisting in the evacuation process should be considered in determining the method of evacuation.

(8) The ability of the fire department to interact with the evacuation should be analyzed. It is important to determine if the fire department can assist in the evacuation or if fire department operations hinder the evacuation efforts.

(9) Evacuation scenarios for hazards that are normally outside of the scope of the Code should be considered to the extent practicable. (See 4.3.1 of NFPA 101.)

(10) Consideration should be given to the desire of the occupants to self-evacuate, especially if the nature of the building or the fire warrants evacuation in the minds of the occupants. Self-evacuation might also be initiated by communication between the occupants themselves through face-to-face contact, mobile phones, and so forth.

(11) An investigation period, a delay in the notification of occupants after the first activation of the fire alarm, could help to reduce the number of false alarms and unnecessary evacuations. However, a limit to such a delay should be established before a general alarm is sounded, such as positive alarm sequence as defined in NFPA 72.
Consideration should be given to the need for an evacuation that might be necessary for a scenario other than a fire (e.g., bomb threat, earthquake).

Contingency plans should be established in the event the fire alarm and communication system fail, which might facilitate the need for total evacuation.

The means of egress systems should be properly maintained to ensure the dependability of the method of evacuation.

Fire prevention policies or procedures, or both, should be implemented that reduce the chance of a fire (e.g., limiting smoking or providing fire-safe trash cans).

The method of evacuation should be properly documented, and written forms of communication should be provided to all of the occupants, which might include sign postings throughout the building. Consideration should be given to the development of documentation for an operation and maintenance manual or a fire emergency plan, or both.

Emergency egress drills should be performed on a regular basis. For more information, see Section 4.7 of NFPA 101.

The AHJ should also be consulted when developing the method of evacuation.

[101]: A.4.8.2.1(3)]

Measures should be in place and be employed to sequence or control the order of a total evacuation, so that such evacuations proceed in a reasonably safe, efficient manner. Such measures include special attention to the evacuation capabilities and needs of occupants with disabilities, either permanent or temporary. For comprehensive guidance on facilitating life safety for such populations, go to www.nfpa.org. For specific guidance on stair travel devices, see ANSI/RESNA ED-1, Emergency Stair Travel Devices Used by Individuals with Disabilities. [101]: A.4.8.2.1(3)]

In larger buildings, especially high-rise buildings, it is recommended that all evacuations — whether partial or total — be managed to sequence or control the order in which certain occupants are evacuated from their origin areas and to make use of available means of egress. In high-rise buildings, the exit stairs, at any level, are designed to accommodate the egress flow of only a very small portion of the occupants — from only one or a few stories, and within a relatively short time period — on the order of a few minutes. In case of a fire, only the immediately affected floor(s) should be given priority use of the means of egress serving that floor(s). Other floors should then be given priority use of the means of egress, depending on the anticipated spread of the fire and its combustion products, and for the purpose of clearing certain floors to facilitate eventual fire service operations. Typically, this means that the one or two floors above and below a fire floor will have secondary priority immediately after the fire floor. Depending on where combustion products move, for example, upward through a building with cool-weather stack effect, the next priority floors will be the uppermost occupied floors in the building. [101]: A.4.8.2.1(3)]

Generally, in order to minimize evacuation time for most or all of a relatively tall building to be evacuated, occupants from upper floors should have priority use of exit stairs. For people descending many stories of stairs, this priority will maximize their opportunity to take rest stops without unduly extending their overall time to evacuate a building. Thus, the precedence behavior of evacuees should be that people already in an exit stair should normally not defer to people attempting to enter the exit stair from lower floors, except for those lower floors most directly impacted by a fire or other imminent
danger. Notably, this is contrary to the often observed behavior of evacuees in high-rise building evacuations where lower floor precedence behavior occurs. (Similarly, in the most commonly observed behavior of people normally disembarking a passenger airliner, people within the aisle defer to people entering the aisle, so that the areas closest to the exit typically clear first.) Changing, and generally managing, the sequence or order within which egress occurs will require effectively informing building occupants and evaluating resulting performance in a program of education, training, and drills. [101:A.4.8.2.1(3)]

When designing the method of evacuation for a complex building, all forms of egress should be considered. For example, consideration could be given to an elevator evacuation system. An elevator evacuation system involves an elevator design that provides protection from fire effects so that elevators can be used safely for egress. See 7.2.13 and A.7.2.12.2.4 of NFPA 101 for more information. [101:A.4.8.2.1(3)]

For further guidance, see the following publications:

1. *SFPE Engineering Guide to Human Behavior in Fire*, which provides information on occupant characteristics, response to fire cues, decision making in fire situations, and methods for predicting evacuation time
2. *NFPA Fire Protection Handbook*, 20th edition, Section 1, Chapter 9, which provides good methodology for managing exposures and determining the method of evacuation
3. *NFPA Fire Protection Handbook*, 20th edition, Section 20, which provides further commentary on methods of evacuation for different occupancies
4. *SFPE Handbook of Fire Protection Engineering*, Volume II, Chapters 58–61, which provide an overview of some of the research on methods of evacuation and methods for predicting evacuation times

[101:A.4.8.2.1(3)]

**10.8.2.3**

Emergency action plans shall be reviewed and updated as required by the AHJ. [101:4.8.2.3]

**A.10.8.2.3**

Emergency action plans are a critical component of assuring-ensuring life safety in buildings. Life safety is the result of an interaction of technical and social systems within the building and in the community. Gathering information to evaluate the performance and effectiveness of emergency action plans is important for verifying system performance and as a basis for improvement. Such reports should be retained by building management and used to inform the process for revision of the building emergency action plan. [101:A.4.8.2.3]

Following any drill or actual emergency or reported emergency occurring in the building, an after action report should be prepared by the building owner or designated representative to document the function of the building's life safety hardware, procedures, and occupant emergency organization. [101:A.4.8.2.3]

For ordinary drills and reported emergencies, areas of success and areas for improvement should be
identified. [101:A.4.8.2.3]

For actual emergencies in the building, where there is major occupant movement, damage, or casualties, additional information should be collected. This includes questions concerning the event, as well as performance of life safety systems. It also identifies improvements in areas such as training, maintenance, interaction with local emergency response organizations, or occupant management. The reports from these significant events should be shared with the local emergency response organization. [101:A.4.8.2.3]

A.10.11.3
Figure A.10.11.3 shows an example of a stairway marking sign. [101:A.7.2.2.5.4]

Figure A.10.11.3 Example of a Stairway Marking Sign. [101:Figure A.7.2.2.5.4]

**FIGURE A.10.11.3 Example of a Stairway Marking Sign.**

***INSERT FIGURE***

10.11.3.1.7
The bottom of the signage shall be located a minimum of 48 in. (1220 mm) above the floor landing, and the top of the signage shall be located a maximum of 84 in. (2135 mm) above the floor landing. [101:7.2.2.5.4.1(G)]

10.11.3.1.10
The floor level designation shall also be tactile in accordance with ICC/ANSI A117.1, Accessible and Usable Buildings and Facilities. [101:7.2.2.5.4.1(J)]

10.11.3.1.16
Previously approved, existing signage shall not be required to comply with 10.11.3.1.12 through 10.11.3.1.15. [101:7.2.2.5.4.1(P)]

A.10.11.3.3
Where environmental conditions (such as illumination levels and directionality or a complex visual field that draws a person’s attention away from stair treads) lead to a hazardous reduction in one’s ability to perceive stair treads, they should be made of a material that allows ready discrimination of the number and position of treads. In all cases, the leading edges of all treads should be readily visible during both ascent and descent. A major factor in injury-producing stair accidents, and in the ability to use stairs efficiently in conditions such as egress, is the clarity of the stair treads as separate stepping surfaces. [101:A.7.2.2.5.4.3]

For stair nosing marking, surface-applied material, such as adhesive-backed tape and magnetic strips, should not be used, as it is not durable under the scuffing from users’ feet and, in coming loose, it creates a tripping hazard. While a carefully applied and consistently maintained coating is acceptable, contrasting color or photoluminescent material integral with the nosings is preferable because of its permanence. It is also the intent of 10.11.3.3 to require the contrasting stairway tread marking to be a
material integral with the stair tread and not a material integral with a stair nosing product that is installed on the stair tread. See also 7.1.6.4 and 7.2.2.3.6 of NFPA 101 for slip resistance uniformity requirements, as well as prohibition of projections on the treads. \[101:7.2.2.5.4.3\]

Guidance on the use of photoluminescent marking is provided by ASTM E2030, Standard Guide for Recommended Uses of Photoluminescent (Phosphorescent) Safety Markings. Additional marking, for example, at the side boundaries of the stair, should be applied in accordance with the guidance provided therein. \[101:7.2.2.5.4.3\]

10.11.3.4 *
Where new contrast marking is provided for stairway handrails, it shall be applied to, or be part of, at least the upper surface of the handrail; have a minimum width of \(\frac{1}{2}\) in. (13 mm); and extend the full length of each handrail. After marking, the handrail shall comply with 7.2.2.4.54 of NFPA 101. Where handrails or handrail extensions bend or turn corners, the stripe shall be permitted to have a gap of not more than 4 in. (100 mm).\[101:7.2.2.5.4.4\]

10.13 Combustible Vegetation

10.13.1 Interior Vegetation. Interior vegetation shall comply with 12.6.9.

10.13.102 Exterior Vegetation.

10.13.102.1 Cut or uncut weeds, grass, vines, and other vegetation shall be removed when determined by the AHJ to be a fire hazard.

10.13.102.2 When the AHJ determines that total removal of growth is impractical due to size or environmental factors, approved fuel breaks shall be established.

10.13.102.3 Designated areas shall be cleared of combustible vegetation to establish the fuel breaks.

10.14.3.1 *General.
Where a life safety evaluation is required by other provisions of the Code, it shall comply with all of the following:

(1) The life safety evaluation shall be performed by persons acceptable to the AHJ.
(2) The life safety evaluation shall include a written assessment of safety measures for conditions listed in 10.14.3.2 and of the building systems and facility management in accordance with 10.14.3.3.
The life safety evaluation shall be approved annually and shall be updated for special or unusual conditions in accordance with the provisions of 13.4.24 of NFPA 101 for existing assembly occupancies.

A.10.14.3.1

Life safety evaluations are examples of performance-based approaches to life safety. In this respect, significant guidance in the form and process of life safety evaluations is provided by Chapter 5 of NFPA 101, keeping in mind the fire safety emphasis in Chapter 5 of NFPA 101. Performance criteria, scenarios, evaluation, safety factors, documentation, maintenance, and periodic assessment (including a warrant of fitness) all apply to the broader considerations in a life safety evaluation. A life safety evaluation deals not only with fire but also with storms, collapse, crowd behavior, and other related safety considerations for which a checklist is provided in A.10.14.3.3. Chapter 5 of NFPA 101 provides guidance, based on fire safety requirements, for establishing a documented case showing that products of combustion in all conceivable fire scenarios will not significantly endanger occupants using means of egress in the facility (for example, due to fire detection, automatic suppression, smoke control, large-volume space, or management procedures). Moreover, means of egress facilities plus facility management capabilities should be adequate to cope with scenarios where certain egress routes are blocked for some reason.

In addition to making realistic assumptions about the capabilities of persons in the facility (e.g., an assembled crowd including many disabled persons or persons unfamiliar with the facility), the life safety evaluation should include a factor of safety of not less than 2.0 in all calculations relating to hazard development time and required egress time (the combination of flow time and other time needed to detect and assess an emergency condition, initiate egress, and move along the egress routes). The factor of safety takes into account the possibility that half of the egress routes might not be used (or be usable) in certain situations.

Regarding crowd behavior, the potential hazards created by larger masses of people and greater crowd densities (which can be problematic during ingress, occupancy, and egress) demand that technology be used by designers, managers, and authorities responsible for buildings to compensate for the relaxed egress capacity provisions of Table 12.4.32.3 of NFPA 101. In very large buildings for assembly use, the hazard of crowd crushes can exceed that of fire or structural failure. Therefore, the building designers, managers, event planners, security personnel, police authorities, and fire authorities, as well as the building construction authorities, should understand the potential problems and solutions, including coordination of their activities. For crowd behavior, this understanding includes factors of space, energy, time, and information, as well as specific crowd management techniques, such as metering. Published guidance on these factors and techniques is found in the SFPE Handbook of Fire Protection Engineering, Chapter 56, Egress Concepts and Design Approaches; Chapter 58, Human Behavior in Fire; and Chapter 59, Employing the Hydraulic Model in Assessing Emergency Movement; the SFPE Guide to Human Behavior in Fire; Section 3, Chapter 13, pp. 3-342–3-366 (Proulx, G., “Movement of People”), and the publications referenced therein.

Table 12.2.3.2 and Table 12.4.32.3 of NFPA 101 are based on a linear relationship between number of
seats and nominal flow time, with not less than 200 seconds (3.3 minutes) for 2000 seats plus 1 second for every additional 50 seats up to 25,000. Beyond 25,000 total seats, the nominal flow time is limited to 660 seconds (11 minutes). Nominal flow time refers to the flow time for the most able group of patrons; some groups less familiar with the premises or less able groups might take longer to pass a point in the egress system. Although three or more digits are noted in the tables, the resulting calculations should be assumed to provide only two significant figures of precision. [101:A.12.4.24.1]

10.14.3.2 *Conditions to Be Assessed.*

Life safety evaluations shall include an assessment of all of the following conditions and related appropriate safety measures:

1. Nature of the events and the participants and attendees
2. Access and egress movement, including crowd density problems
3. Medical emergencies
4. Fire hazards
5. Permanent and temporary structural systems
6. Severe weather conditions
7. Earthquakes
8. Civil or other disturbances
9. Hazardous materials incidents within and near the facility
10. Relationships among facility management, event participants, emergency response agencies, and others having a role in the events accommodated in the facility

[101:12.4.24.2]

A.10.14.3.2

The SFPE Engineering Guide to Fire Risk Assessment provides a methodology for evaluating the fire risks associated with the conditions outlined in 10.14.3.2.

10.14.3.3 *Building Systems and Facility Management Assessments.*

Life safety evaluations shall include assessments of both building systems and facility management upon which reliance is placed for the safety of facility occupants, and such assessments shall consider scenarios appropriate to the facility. [101:12.4.24.3]

A.10.14.3.3

Factors to be considered in a life safety evaluation include the following:

1. Nature of the events being accommodated, including the following:
   (a) Ingress, intra-event movement, and egress patterns
   (b) Ticketing and seating policies/practices
   (c) Event purpose (e.g., sports contest, religious meeting)
   (d) Emotional qualities (e.g., competitiveness) of event
   (e) Time of day when event is held
   (f) Time duration of single event
   (g) Time duration of attendees' occupancy of the building
2. Occupant characteristics and behavior, including the following:
(a) Homogeneity
(b) Cohesiveness
(c) Familiarity with building
(d) Familiarity with similar events
(e) Capability (as influenced by factors such as age, physical abilities)
(f) Socioeconomic factors
(g) Small minority involved with recreational violence
(h) Emotional involvement with the event and other occupants
(i) Use of alcohol or drugs
(j) Food consumption
(k) Washroom utilization

(3) Management, including the following:
   (a) Clear, contractual arrangements for facility operation/use as follows:
       i. Between facility owner and operator
       ii. Between facility operator and event promoter
       iii. Between event promoter and performer
       iv. Between event promoter and attendee
       v. With police forces
       vi. With private security services
       vii. With ushering services
   (b) Experience with the building
   (c) Experience with similar events and attendees
   (d) Thorough, up-to-date operations manual
   (e) Training of personnel
   (f) Supervision of personnel
   (g) Communications systems and utilization
   (h) Ratios of management and other personnel to attendees
   (i) Location/distribution of personnel
   (j) Central command location
   (k) Rapport between personnel and attendees
   (l) Personnel support of attendee goals
   (m) Respect of attendees for personnel due to the following:
       i. Dress (uniform) standards
       ii. Age and perceived experience
       iii. Personnel behavior, including interaction
       iv. Distinction between crowd management and control
       v. Management concern for facility quality (e.g., cleanliness)
       vi. Management concern for entire event experience of attendees (i.e., not just during the occupancy of the building)

(4) Emergency management preparedness, including the following:
   (a) Complete range of emergencies addressed in operations manual
   (b) Power loss
   (c) Fire
   (d) Severe weather
   (e) Earthquake
   (f) Crowd incident
   (g) Terrorism
   (h) Hazardous materials
Transportation accident (e.g., road, rail, air)
Communications systems available
Personnel and emergency forces ready to respond
Attendees clearly informed of situation and proper behavior

Building systems, including the following:
- Structural soundness
- Normal static loads
- Abnormal static loads (e.g., crowds, precipitation)
- Dynamic loads (e.g., crowd sway, impact, explosion, wind, earthquake)
- Stability of nonstructural components (e.g., lighting)
- Stability of movable (e.g., telescoping) structures
- Fire protection
- Fire prevention (e.g., maintenance, contents, housekeeping)
- Compartmentation
- Automatic detection and suppression of fire
- Smoke control
- Alarm and communications systems
- Fire department access routes and response capability
- Structural integrity
- Weather protection
- Wind
- Precipitation (attendees rush for shelter or hold up egress of others)
- Lightning protection
- Circulation systems
- Flowline or network analysis
- Waywinding and orientation
- Merging of paths (e.g., precedence behavior)
- Decision/branching points
- Route redundancies
- Counterflow, crossflow, and queuing situations
- Control possibilities, including metering
  - Flow capacity adequacy
  - System balance
  - Movement time performance
  - Flow times
  - Travel times
  - Queuing times
  - Route quality
  - Walking surfaces (e.g., traction, discontinuities)
  - Appropriate widths and boundary conditions
  - Handrails, guardrails, and other rails
  - Ramp slopes
  - Step geometries
  - Perceptual aspects (e.g., orientation, signage, marking, lighting, glare, distractions)
  - Route choices, especially for vertical travel
  - Resting/waiting areas
  - Levels of service (overall crowd movement quality)
  - Services
A scenario-based approach to performance-based fire safety is addressed in Chapter 5 of NFPA 101. In addition to using such scenarios and, more generally, the attention to performance criteria, evaluation, safety factors, documentation, maintenance, and periodic assessment required when the Chapter 5 of NFPA 101 option is used, life safety evaluations should consider scenarios based on characteristics important in assembly occupancies. These characteristics include the following:

1. Whether there is a local or mass awareness of an incident, event, or condition that might provoke egress
2. Whether the incident, event, or condition stays localized or spreads
3. Whether or not egress is desired by facility occupants
4. Whether there is a localized start to any egress or mass start to egress
5. Whether exits are available or not available

Examples of scenarios and sets of characteristics that might occur in a facility follow.

**Scenario 1.** Characteristics: mass start, egress desired (by management and attendees), exits not available, local awareness.  
Normal egress at the end of an event occurs just as a severe weather condition induces evacuees at the exterior doors to retard or stop their egress. The backup that occurs in the egress system is not known to most evacuees, who continue to press forward, potentially resulting in a crowd crush.

**Scenario 2.** Characteristics: mass start, egress not desired (by management), exits possibly not available, mass awareness.  
An earthquake occurs during an event. The attendees are relatively safe in the seating area. The means of egress outside the seating areas are relatively unsafe and vulnerable to aftershock damage. Facility management discourages mass egress until the means of egress can be checked and cleared for use.

**Scenario 3.** Characteristics: local start, incident stays local, egress desired (by attendees and management), exits available, mass awareness.  
A localized civil disturbance (e.g., firearms violence) provokes localized egress, which is seen by attendees, generally, who then decide to leave also.
Scenario 4. Characteristics: mass start, egress desired (by attendees), incident spreads, exits not available, mass awareness. [101:A.12.4.24.3]

In an open-air facility unprotected from wind, precipitation, and lightning, sudden severe weather prompts egress to shelter, but not from the facility. The means of egress congest and block quickly as people in front stop once they are under shelter while people behind them continue to press forward, potentially resulting in a crowd crush. [101:A.12.4.24.3]

These scenarios illustrate some of the broader factors to be taken into account when assessing the capability of both building systems and management features on which reliance is placed in a range of situations, not just fire emergencies. Some scenarios also illustrate the conflicting motivations of management and attendees, based on differing perceptions of danger and differing knowledge of hazards, countermeasures, and capabilities. Mass egress might not be the most appropriate life safety strategy in some scenarios, such as Scenario 2. [101:A.12.4.24.3]

Table A.10.14.3.3 summarizes the characteristics in the scenarios and provides a framework for developing other characteristics and scenarios that might be important for a particular facility, hazard, occupant type, event, or management. [101:A.12.4.24.3]

4Table A.10.14.3.3 Life Safety Evaluation Scenario Characteristics Matrix

<table>
<thead>
<tr>
<th>Scen ario</th>
<th>Local Aw ar eness</th>
<th>Mass Aw ar eness</th>
<th>Inc ident Local ized</th>
<th>Inc ident Spreads</th>
<th>Egre ss Desi red</th>
<th>Egre ss Not Desi red</th>
<th>Manageme nt</th>
<th>Occupants</th>
<th>Loc al Mass St art</th>
<th>Exits Available</th>
<th>Exits Not Available</th>
<th>Other</th>
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</tbody>
</table>

[101:Table A.12.4.24.3]

10.14.3.3.1 Building Systems.
Prior to issuance of the building permit, the design team shall provide the AHJ with building systems documentation in accordance with 10.14.3.4. [101:12.4.24.3.1]

10.14.3.3.2 Facility Management.
Prior to issuance of the certificate of occupancy, the facility management shall provide the AHJ with facility management documentation in accordance with 10.14.3.5. [101:12.4.24.3.2]

10.14.3.3.3 Life Safety Evaluation.
10.14.3.3.1
Prior to issuance of the building permit, the persons performing the life safety evaluation shall confirm that the building systems provide safety measures. [101:12.4.21.3.3.1]

10.14.3.3.2
Prior to issuance of the certificate of occupancy, the owner shall confirm that the facility management and operational plans provide appropriate safety measures. [101:12.4.21.3.3.2]

10.14.3.3.3
The life safety evaluation shall be performed by persons acceptable to the authority having jurisdictionAHJ. [101:12.4.21.3.3.3]

The AHJ shall be provided with a life safety building systems document providing the information required in 10.14.3.4.2 through 10.14.3.4.4. [101:12.4.21.4]

10.14.3.4.1 Document Distribution.
The persons performing the life safety evaluation, the AHJ, the A/E design team, and the building owner shall receive a copy of the life safety building systems document prior to issuance of the building permit. [101:12.4.21.4.1]

10.14.3.4.2 Life Safety Narrative.
A life safety narrative shall be provided describing the following, as applicable:

(1) Building occupancy, construction type, and intended uses and events
(2) Building area and population capacity of the proposed facility
(3) Principal fire and life safety features/strategies for the building, including the following, as applicable:
   (a) Egress
   (b) Access control
   (c) Fire barriers, smoke barriers, and smoke partitions
   (d) Fire suppression systems
   (e) Smoke control/protection
   (f) Fire detection and alarm
   (g) PA system
   (h) Emergency elevator operation
   (i) Emergency power and lighting
   (j) Provisions for patrons with disabilities
   (k) Fire department access
   (l) Fire/emergency command center

(4) Exterior construction design parameters used/applied
10.14.3.4.3 Life Safety Floor Plans.
Life safety floor plans of each level shall be provided, as applicable, with the following:

1. Occupant load, exit location, egress capacity, main entrance/exit, horizontal exits, travel distance and exit discharge
2. Fire barriers, smoke barriers, and smoke partitions
3. Areas of smoke-protected assembly occupancy
4. Separate smoke-protected areas or zones
5. Areas of other occupancy type and separations
6. Unprotected vertical openings
7. Event plans for each anticipated type of event depicting the following:
   a. Seating configuration
   b. Exhibit booth layout
   c. Stage location
   d. Occupant load, egress capacity required, exits provided, and travel distance
   e. Any floor or stage use restrictions
   f. Plan and/or section drawing indicating where sprinkler protection is omitted
   g. Areas of refuge — interior and exterior

10.14.3.4.4 Engineering Analysis and Calculations.
Where active or passive smoke control is used, an engineering analysis shall be provided and shall include the following:

1. Smoke protection analysis to substitute the use of smoke-protected assembly seating as follows:
   a. Performance-based design methods approved by the AHJ
   b. Smoke control air requirements per NFPA 92
   c. Smoke control assumptions, such as fire scenario description, fire size quantification, and smoke development/smoke movement analysis
   d. Proposed testing protocol for smoke control system and pass/fail criteria
   e. Timed egress analysis assumed flow rates and travel speeds
   f. Assumed flow rates and travel speeds

2. Sprinkler protection calculations, including an engineering analysis substantiating locations in accordance with 12.3.5.3 | 3.2.7.3 | 3.2.6.3 where sprinkler protection would be ineffective due to height and combustible loading

3. Load diagram of rigging/load capacity of gridiron, fly loft, or long-span roof structure used for hanging overhead objects
The AHJ shall be provided with a life safety management document providing the information required in 10.14.3.5.2 through 10.14.3.5.7. [101:12.4.24.5]

10.14.3.5.1 Document Distribution.
The persons performing the life safety evaluation, the AHJ, the A/E design team and the building owner shall receive a copy of the life safety management document prior to issuance of the certificate of occupancy. [101:12.4.24.5.1]

10.14.3.5.2 Facility Management and Operational Plans.
Facility management and operational plans shall address the following, as applicable:

1. Best practices adopted or recognized
2. Emergency plans
3. Evacuation plans
4. Shelter-in-place plans, including capacities and protection considerations
5. Crowd management training plan
6. Safety plans, which include the following:
   a. Training plans
   b. Safety equipment plans
7. Fire alarm, smoke control system protocol, and testing plans
8. First aid or medical treatment plans, which include the following:
   a. Defined levels of service
   b. Standing orders adopted
   c. Supply and equipment plan
9. Housekeeping plans — biological, medical, hazardous materials cleaning
10. Emergency communication plans, which include the following:
   a. Chain of authority and incident command system employed
   b. Contact information for the following:
      i. Venue personnel
      ii. Emergency management and response organizations (such as fire, police, medical, utility, transportation, and key stakeholders)
   c. Communication systems
   d. Standard announcement for incidents or emergency situations
11. Risk and threat assessment for venue and surrounding area for the following:
   a. Severe weather
   b. Hazardous materials
   c. Terrorism
   d. Hostile intruder
12. Operating procedures and protocols for risks, such as the following:
   a. Severe weather preparedness and monitoring plans
   b. Hazardous materials incidence response plans
   c. Terrorism response plans
   d. Hostile intruder response plans
13. First responder response/arrival routes plans
14. Alcohol management plans
15. Food safety plans
(16) Rigging and temporary performance structure, which includes the following:
   (a) Design and safety review plans
   (b) Emergency action plans
(17) Chemical and hazardous materials information and data
(18) Barrier and wall protection plans for motor sports or similar events

[101:12.4.24.5.2]

10.14.3.5.3 Records.
Records of the facility management plans, including procedures and location, shall be maintained, for the following:

(1) Crowd management training
(2) Safety training
(3) Fire alarm, smoke control system maintenance, and test records
(4) First aid or medical treatment and regulation compliance

[101:12.4.24.5.3]

10.14.3.5.4 Building Systems Reference Guide.
A building systems reference guide shall be provided in accordance with 10.14.3.5.4.1 through 10.14.3.5.4.3. [101:12.4.24.5.4]

10.14.3.5.4.1
A basic life safety building systems reference guide shall be developed and maintained.

[101:12.4.24.5.4.1]

10.14.3.5.4.2
The life safety building systems reference guide shall contain the important and key information for the venue management’s use when planning events/activities for the safety of patrons, performers/participants, employees and vendors. [101:12.4.24.5.4.2]

10.14.3.5.4.3
The life safety building systems document in accordance with 10.14.3.4 shall be permitted to be used, and additionally the life safety building systems reference guide shall include the following, as applicable:

(1) Occupant capacity of every space/room
(2) Egress flow diagrams, including assumed flow rates, and capacities of all aisles and hallways, including public and nonpublic areas
(3) Capacities of all exterior doors and/or choke points in immediate perimeter areas
(4) Limitations or assumptions for ingress control that could be in place during an emergency egress/evacuation, including control gates, queuing barriers, and turnstiles
(5) Capacities of immediate perimeter exterior walkways, including assumed flow rates for exterior areas
(6) Assumed egress paths for normal conditions — transportation modes
Management-level sequencing charts for alarm and emergency communication systems, the manual, or override options/instructions that include the following:

(a) List of codes or alarm signals
(b) Location of manual overrides
(c) Description of sequence of operations during an alarm, such as exhaust fans operate or doors open

Principal fire and life safety features/strategies, such as sprinklers, smoke control, fire alarm notifications, PA system, emergency power, and fire department access

Assumptions when developing occupancy plans for venue floor, open areas, and nonevent spaces, such as the following:

(a) Event floor plans/setup diagrams for each typical event/activity
(b) Fire sprinkler and smoke protection capabilities

Severe weather shelter areas, locations, structure considerations (limitations), capacities (occupancy and density factor)

Command center, which includes the following:

(a) Location (formal or informal)
(b) Structural integrity considerations
(c) Redundant locations and/or capabilities
(d) Jurisdictional rights — assumed and/or applied

Locations and capacities of wheelchair and mobility-impaired seating

Locations and capacities of areas of refuge and other safe areas

Rigging or structural load capacities of grids, truss structure, fly lofts, ceilings, floors, ramps, and staging

List of locations of emergency equipment such as fire extinguishers, fire hose cabinets, fire hydrants, and AEDs.

Sequencing of electrical service, such as the following:

(a) Emergency generators and charts of all areas illuminated during power outages
(b) Multiple electrical feed capabilities

List of mechanical, movable equipment in the facility

Potential hazards in the surrounding neighborhood, including train tracks and propane stations

Assumptions or accommodations considered and used in design

10.14.3.5.5

The facility management plans shall be maintained and adjusted as necessary for changes to the venue structure, operating purposes and style, and event occupancy. [101:12.4.24.5.5]

10.14.3.5.6

Facility management and operational plans shall be submitted to the AHJ annually. [101:12.4.24.5.6]

10.14.3.5.7

For events and activities at the venue that are outside the normal operating conditions or vary from the normal facility management plans, the following shall apply:

(1) Facility management shall perform an event/activity-specific facility management plan for the AHJ to review.
(2) Approval of the AHJ for the specific facility management plan shall occur prior to such event.

[101:12.4.21.5.7]

11.2.2 Ventilating or Heat-Producing Equipment.

Ventilating or heat-producing equipment shall be in accordance with NFPA 91, NFPA 211, NFPA 31, NFPA 54, or NFPA 70, NFPA 91, or NFPA 211, as applicable, unless such installations are approved existing installations, which shall be permitted to be continued in service. [101:9.2.2]

A.12.5

The requirements pertaining to interior finish are intended to restrict the spread of fire over the continuous surface forming the interior portions of a building. [101:A.10.2]

The requirements are based on fire testing to NFPA 286 (with the criteria of 12.5.4.2), which apply to all interior finish materials. Many interior finish materials are permitted to be tested based on other fire tests, such as ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, UL 723, Test for Surface Burning Characteristics of Building Materials, or NFPA 265 as provided in the relevant subsection of Section 10.212.5. [101:A.10.2]

A.12.5.2

The requirements pertaining to interior finish are intended to restrict the spread of fire over the continuous surface forming the interior portions of a building. The presence of multiple paint layers has the potential for paint delamination and bubbling or blistering of paint. Testing (NFPA Fire Technology, August 1974, “Fire Tests of Building Interior Covering Systems,” David Waksman and John Ferguson, Institute for Applied Technology, National Bureau of Standards) has shown that adding up to two layers of paint with a dry film thickness of about 0.007 in. (0.18 mm) will not change the fire properties of surface-covering systems. Testing has shown that the fire properties of the surface-covering systems are highly substrate dependent and that thin coatings generally take on the characteristics of the substrate. When exposed to fire, the delamination, bubbling, and blistering of paint can result in an accelerated rate of flame spread. [101:A.10.2.1]

12.5.2.1

Classification of interior finish materials shall be in accordance with tests made under conditions simulating actual installations, provided that the authority having jurisdiction AHJ is permitted to establish the classification of any material for which classification by a standard test is not available. [101:10.2.1.1]

A.12.5.3

Table A.12.5.3 provides a compilation of the interior finish requirements of 7.1.4 of NFPA 101 and the occupancy chapters (Chapters 12 through 42) of NFPA 101. [101:A.10.2.2]
# Table A.12.5.3 Interior Finish Classification Limitations

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Exits</th>
<th>Exit Access Corridors</th>
<th>Other Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly — new</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>&gt;300 occupant load</td>
<td>I or II</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>≤300 occupant load</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Assembly — existing</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>&gt;300 occupant load</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>≤300 occupant load</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Educational — new</td>
<td>A</td>
<td>A or B</td>
<td>A or B; C on low</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>A or B</td>
<td>partitions*</td>
</tr>
<tr>
<td>Educational — existing</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Day-care centers — new</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Day-care centers — existing</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Day-care homes — new</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Day-care homes — existing</td>
<td>A</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
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<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>NA</td>
<td>B on lower portion of</td>
<td>B in small individual</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>corridor wall*</td>
<td>rooms*</td>
</tr>
<tr>
<td>Health care — existing</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Detention and correctional — new</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>(sprinklers mandatory)</td>
<td>I or II</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Detention and correctional — existing</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>One- and two-family dwellings and lodging or rooming houses</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Hotels and dormitories — new</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Hotels and dormitories — existing</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II*</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Apartment buildings — new</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
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<td></td>
<td>I or II</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Apartment buildings — existing</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Residential board and care — (See Chapters 32 and 33.)</td>
<td>A or B</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Mercantile — new</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
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</tr>
<tr>
<td>Mercantile — existing</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Class A or class B stores</td>
<td>A</td>
<td>A or B</td>
<td>Ceilings — A or B; walls</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>— A, B, or C</td>
</tr>
</tbody>
</table>
Class C stores

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Exits</th>
<th>Exit Access Corridors</th>
<th>Other Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business and ambulatory health care — new</td>
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<td>A, B, or C</td>
</tr>
<tr>
<td>Business and ambulatory health care — existing</td>
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<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Industrial</td>
<td>A or B I or II</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Storage</td>
<td>A or B I or II</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
</tbody>
</table>

*See corresponding chapters for details.

NA: Not applicable.

Notes:

(1) Class A interior wall and ceiling finish — flame spread index, 0–25 (new applications); smoke developed index, 0–450.

(2) Class B interior wall and ceiling finish — flame spread index, 26–75 (new applications); smoke developed index, 0–450.

(3) Class C interior wall and ceiling finish — flame spread index, 76–200 (new applications); smoke developed index, 0–450.

(4) Class I interior floor finish — critical radiant flux, not less than 0.45 W/cm².

(5) Class II interior floor finish — critical radiant flux, not more than 0.22 W/cm², but less than 0.45 W/cm².

(6) Automatic sprinklers — where a complete standard system of automatic sprinklers is installed, interior wall and ceiling finish with a flame spread rating not exceeding Class C is permitted to be used in any location where Class B is required, and Class B interior wall and ceiling finish is permitted to be used in any location where Class A is required; similarly, Class II interior floor finish is permitted to be used in any location where Class I is required, and no interior floor finish classification is required where Class II is required. These provisions do not apply to new detention and correctional occupancies.

(7) Exposed portions of structural members complying with the requirements for heavy timber construction are permitted.

[101:Table A.10.2.2]
<table>
<thead>
<tr>
<th>Assembly — existing</th>
<th>A</th>
<th>A or B</th>
<th>A or B</th>
</tr>
</thead>
<tbody>
<tr>
<td>occupant load</td>
<td>A</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>≤300 occupant load</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Educational — new</td>
<td>A</td>
<td>A or B</td>
<td>A or B; C with low partitions*</td>
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<tr>
<td></td>
<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Educational — existing</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Day-care centers — new</td>
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<td>A</td>
<td>A or B</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Day-care centers — existing</td>
<td>A or B</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Day-care homes — new</td>
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<tr>
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<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Day-care homes — existing</td>
<td>A or B</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Health care — new</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>NA</td>
<td>B on lower portion of corridor wall*</td>
<td>B in small individual rooms*</td>
</tr>
<tr>
<td>Health care — existing</td>
<td>A or B</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td>Detention and correctional — new</td>
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<td>A or B</td>
<td>A, B, or C</td>
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<tr>
<td>(sprinklers mandatory)</td>
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<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Detention and correctional — existing</td>
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<td>A or B</td>
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<tr>
<td></td>
<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>One- and two-family dwellings and lodging or rooming houses</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Hotels and dormitories — new</td>
<td>A</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Hotels and dormitories — existing</td>
<td>A or B</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II*</td>
<td>I or II*</td>
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</tr>
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<td>Apartment buildings — new</td>
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<td>A or B</td>
<td>A, B, or C</td>
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<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Apartment buildings — existing</td>
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<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II*</td>
<td>I or II*</td>
<td>NA</td>
</tr>
<tr>
<td>Residential board and care — (See Chapters 32 and 33, )</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Mercantile — new</td>
<td>A or B</td>
<td>A or B</td>
<td>A or B</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Mercantile — existing</td>
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<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Class A or class B-stores</td>
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<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Class C stores</td>
<td>A or B</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Business and ambulatory health care — new</td>
<td>A or B</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td></td>
<td>I or II</td>
<td>I or II</td>
<td>NA</td>
</tr>
<tr>
<td>Business and ambulatory health care — existing</td>
<td>A or B</td>
<td>A or B</td>
<td>A, B, or C</td>
</tr>
<tr>
<td>Industrial</td>
<td>A or B</td>
<td>A, B, or C</td>
<td>A, B, or C</td>
</tr>
</tbody>
</table>
**Notes:**

(1) Class A interior wall and ceiling finish — flame spread index, 0–25 (new applications); smoke developed index, 0–450.

(2) Class B interior wall and ceiling finish — flame spread index, 26–75 (new applications); smoke developed index, 0–450.

(3) Class C interior wall and ceiling finish — flame spread index, 76–200 (new applications); smoke developed index, 0–450.

(4) Class I interior floor finish — critical radiant flux, not less than 0.45 W/cm².

(5) Class II interior floor finish — critical radiant flux, not more than 0.22 W/cm², but less than 0.45 W/cm².

(6) Automatic sprinklers — where a complete standard system of automatic sprinklers is installed, interior wall and ceiling finish with a flame spread rating not exceeding Class C is permitted to be used in any location where Class B is required, and Class B interior wall and ceiling finish is permitted to be used in any location where Class A is required; similarly, Class II interior floor finish is permitted to be used in any location where Class I is required, and no interior floor finish classification is required where Class II is required. These provisions do not apply to new detention and correctional occupancies.

(7) Exposed portions of structural members complying with the requirements for heavy timber construction are permitted.

---

**A.12.5.4**

**ASTM E84, Standard Test Method of Surface Burning Characteristics of Building Materials,** and **UL 723, Test for Surface Burning Characteristics of Building Materials,** are considered nationally recognized consensus standard test methods for determining the flame spread index and smoke developed index of building materials and are likely to yield equivalent test results. *(See also A.12.5.4.1.1) [101:A.10.2.3]*

**12.5.4.1.2 ***

Materials tested in accordance with 12.5.4.1.1 and complying with 12.5.4.2 shall be considered also to comply with the requirements of a Class A, Class B, or Class C in accordance with 12.5.4.3. *(101:10.2.3.1.2)*

**A.12.5.4.1.2**

Materials tested per NFPA 286 and meeting the criteria of 12.5.4.2 are considered Class A materials. However, not all materials that meet the requirements for Class A based on testing per ASTM E84 or UL 723 will meet the requirements of this Code for testing in accordance with NFPA 286.
12.5.4.3 *Interior Wall and Ceiling Finish Materials Tested in Accordance with ASTM E84 or UL 723.

Interior wall and ceiling finish materials shall be classified in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Standard Test Method for Surface Burning Characteristics of Building Materials*, except as indicated in 12.5.4.4 and 12.5.4.5, and shall be grouped in the following classes in accordance with their flame spread and smoke developed indexes:

1. **Class A**: Flame spread index 0–25; smoke developed index 0–450.
2. **Class B**: Flame spread index 26–75; smoke developed index 0–450.
3. **Class C**: Flame spread index 76–200; smoke developed index 0–450.

A.12.5.4.3

It has been shown that the method of mounting interior finish materials usually affects actual performance. The use of standard mounting methods will be helpful in determining appropriate fire test results. Where materials are tested in intimate contact with a substrate to determine a classification, such materials should be installed in intimate contact with a similar substrate. Such details are especially important for “thermally thin” materials. For further information, see ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*. [101:A.10.2.3.3]

Some interior wall and ceiling finish materials, such as fabrics not applied to a solid backing, do not lend themselves to a test made in accordance with ASTM E84. In such cases, the large-scale test outlined in NFPA 701 is permitted to be used. In 1989 the NFPA Technical Committee on Fire Tests eliminated the so-called “small-scale test” from NFPA 701 because the results had been shown not to represent a fire performance that corresponded to what happened in real scale. Since then, NFPA 701 no longer contains a “small-scale test” but it now contains two tests (Test 1 and Test 2), which apply to materials as a function of their areal density. Thus NFPA 701 Test 1 applies to fabrics (other than vinyl-coated fabric blackout linings) having an areal density less than or equal to 21 oz/yt (700 g/m²), while NFPA 701 Test 2 applies to fabrics with an areal density greater than 21 oz/yt (700 g/m²), vinyl-coated fabric blackout linings, decorative objects, and films. Representations that materials or products have been tested to the small-scale test in NFPA 701 normally refer to the pre-1989 small-scale test, which no longer exists and which does not represent acceptable fire performance. [101:A.10.2.3.3]

Prior to 1978, the test report described by ASTM E84 included an evaluation of the fuel contribution as well as the flame spread index and the smoke developed index. However, it is now recognized that the measurement on which the fuel contribution is based does not provide a valid measure. Therefore, although the data are recorded during the test, the information is no longer normally reported. Classification of interior wall and ceiling finish thus relies only on the flame spread index and smoke developed index. [101:A.10.2.3.3]
The 450 smoke developed index limit is based solely on obscuration. (See A.10.2.4.4 of NFPA 101.) [101:A.10.2.3.3]

A.12.5.5

Surface nonmetallic raceway products, as permitted by NFPA 70, are not interior finishes and are not subject to the provisions of Chapter 10 of NFPA 101. [101:A.10.2.4]

12.5.5.1 Thickness Exemption.

The provisions of 12.5.4 shall not apply to materials having a total thickness of less than $1/28$ in. (0.9 mm) that are applied directly to the surface of walls and ceilings where both all of the following conditions are met:

1. The wall or ceiling surface is a noncombustible or limited combustible material.
2. The materials applied meet the requirements of Class A interior wall or ceiling finish when tested in accordance with 12.5.4.3, using fiber cement board as the substrate material.
3. The material applied is not one of the following:
   a. A textile wall or ceiling covering
   b. An expanded vinyl wall or ceiling covering

[101:10.2.4.1]

12.5.5.3.3.1

One of the following fire tests shall be used for assessing the combustibility of cellular or foamed plastic materials as interior finish:

1. NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, with the acceptance criteria of 12.5.4.2
2. UL 1715, Fire Test of Interior Finish Material (including smoke measurements, with total smoke release not to exceed 1000 m²)
3. UL 1040, Fire Test of Insulated Wall Construction

[101:10.2.4.3.3.1]

A.12.5.5.3.3.2

Both NFPA 286 and UL 1715, Fire Test of Interior Finish Material, contain smoke obscuration criteria. UL 1040, Fire Test of Insulated Wall Construction, and ANSI/FM 4880, American National Standard for Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials, Approval Standard for Class I Insulated Wall or Wall and Roof/Ceiling Panels; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems, do not. Smoke obscuration is an important component of the fire performance of cellular or foamed plastic materials. [101:A.10.2.4.3.3.2]
**12.5.5.3.3**

Cellular or foamed plastic materials tested in accordance with UL 1040, *Fire Test of Insulated Wall Construction*, or ANSI/FM 4880, *American National Standard for Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials*, shall also be tested for smoke release using NFPA 286 with the acceptance criteria of 12.5.4.2. [101:10.2.4.3.3]

**12.5.5.4 *Textile Wall Coverings.*

Where used as interior wall finish materials, textile materials shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall comply with the requirements of either 12.5.4.1, 12.5.5.4.1, or 12.5.5.4.3. [101:10.2.4.4]

**12.5.5.4.3**


1. On the walls of rooms or areas protected by an approved automatic sprinkler system.
2. On partitions that do not exceed three-quarters of the floor-to-ceiling height or do not exceed 8 ft (2440 mm) in height, whichever is less.
3. On the lower 48 in. (1220 mm) above the finished floor on ceiling-height walls and ceiling-height partitions.
4. Previously approved existing installations of textile material meeting the requirements of Class A when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials* or UL 723, *Standard Test Method for Surface Burning Characteristics of Building Materials*, shall be permitted to be continued to be used.

[101:10.2.4.4.3]

**12.5.5.5 *Expanded Vinyl Wall Coverings.*

Where used as interior wall finish materials, expanded vinyl wall coverings shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall comply with the requirements of either 12.5.4.1, 12.5.5.4.1, or 12.5.5.4.3. [101:10.2.4.5]

**12.5.5.6 Textile Ceiling Coverings.

Where used as interior ceiling finish materials, textile materials shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall meet one of the following:

1. Comply with the requirements of 12.5.4.1
Method for Surface Burning Characteristics of Building Materials, using the specimen preparation and mounting method of ASTM E2404, Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics, and used on the ceilings of rooms or areas protected by an approved automatic sprinkler system. [101:10.2.4.6]

12.5.5.7 Expanded Vinyl Ceiling Coverings.
Where used as interior ceiling finish materials, expanded vinyl materials shall be tested in the manner intended for use, using the product mounting system, including adhesive, and shall meet one of the following:

(1) Comply with the requirements of 12.5.4.1
(2) Meet the requirements of Class A when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Standard Test Method for Surface Burning Characteristics of Building Materials, using the specimen preparation and mounting method of ASTM E2404, Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics, and used on the ceilings of rooms or areas protected by an approved automatic sprinkler system. [101:10.2.4.7]

12.5.5.11.2
If the materials are tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, specimen preparation and mounting shall be in accordance with ASTM E2599, Standard Practice for Specimen Preparation and Mounting of Reflective Insulation, Radiant Barrier, and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics. [101:10.2.4.11.2]

12.5.5.12.1
Listed factory finished metal ceiling and wall panels meeting the requirements of Class A, in accordance with 12.5.4, shall be permitted to be finished with one additional application of paint. [101:10.2.4.12.1]

12.5.5.14.2
If the materials are tested in accordance with NFPA 286 they shall use the product-mounting system, including adhesive, described in Section 5.8.9 of NFPA 286. [101:10.2.4.14.2]

12.5.5.15.1
Light-transmitting plastics shall be permitted to be used as interior wall and ceiling finish shall be permitted based on large-scale fire tests per 12.5.5.3.3.1, which substantiate the combustibility characteristics of the plastics for the use intended under actual fire conditions. [101:10.2.4.15.1]
12.5.5.2
The tests shall be performed on a light-transmitting plastic assembly related to the actual end-use configuration and on the maximum thickness intended for use. [101:10.2.4.15.2]

A.12.5.5.15
Light-transmitting plastics are used for a variety of purposes, including light diffusers, exterior wall panels, skylights, canopies, glazing, and the like. Previous editions of the Code have not addressed the use of light-transmitting plastics. Light-transmitting plastics will not normally be used in applications representative of interior finishes. Accordingly, ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, can produce test results that might or might not apply. [101:A.10.2.4.15]

Light-transmitting plastics are regulated by model building codes such as NFPA 5000. Model building codes provide adequate regulation for most applications of light-transmitting plastics. Where an AHJ determines that a use is contemplated that differs from uses regulated by model building codes, light-transmitting plastics in such applications can be substantiated by fire tests that demonstrate the combustibility characteristics of the light-transmitting plastics for the use intended under actual fire conditions. [101:A.10.2.4.15]

For additional information on light transmitting plastics, see Section 48.7 of NFPA 5000. [101:A.10.2.4.15]

12.5.6.3.2
The provision of 12.5.6.3.1 shall not apply to artwork and teaching materials in sprinklered educational or day-care occupancies in accordance with 20.2.4.4.3(3), 20.2.4.4.3(4) and 20.3.4.2.3.5.3(3), and 20.3.4.2.3.5.3(4). [101:10.2.5.3.2]

A.12.5.7.1
It is the intent of NFPA 101 to mandate interior wall and ceiling finish materials that obtain their fire performance and smoke developed characteristics in their original form. However, in renovations, particularly those involving historic buildings, and in changes of occupancy, the required fire performance or smoke developed characteristics of existing surfaces of walls, partitions, columns, and ceilings might have to be secured by applying approved fire-retardant coatings to surfaces having higher flame spread ratings than permitted. Such treatments should comply with the requirements of NFPA 703. When fire-retardant coatings are used, they need to be applied to surfaces properly prepared for the material, and application needs to be consistent with the product listing. Deterioration of coatings applied to interior finishes can occur due to repeated cleaning of the surface or painting over applied coatings, but permanency must be assured in some appropriate fashion. Fire-retardant coatings must possess the desired degree of permanency and be maintained so as to retain the effectiveness of the treatment under the service conditions encountered in actual use. [101:A.10.2.6.1]
A.12.5.8.1

12.6 Contents and Furnishings.

12.6.1 * Draperies, Curtains, and Other Hanging or Suspended Furnishings and Decorations.
Where required by the applicable provisions of this Code, draperies, curtains, and other similar loosely hanging or suspended furnishings and decorations shall meet the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701. [101:10.3.1]

A.12.6.1
Testing per NFPA 701 applies to textiles and films used in a hanging configuration. If the textiles are to be applied to surfaces of buildings or backing materials as interior finishes for use in buildings, they should be treated as interior wall and ceiling finishes in accordance with Section 12.5.2 of this Code, and they should then be tested for flame spread index and smoke developed index values in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials, or for flame spread and flashover in accordance with NFPA 265. Films and other materials used as interior finish applied to surfaces of buildings should be tested for flame spread index and smoke developed index values in accordance with ASTM E84 or UL 723 or for heat and smoke release and flashover in accordance with NFPA 286. [101:A.10.3.1]

The test results from NFPA 701 are suitable for classification purposes but should not be used as input into fire models, because they are not generated in units suitable for engineering calculations. [101:A.10.3.1]

12.6.2 Smoldering Ignition of Upholstered Furniture and Mattresses.

12.6.2.1 * Smoldering Ignition of Upholstered Furniture.
Newly introduced upholstered furniture, except as otherwise permitted by Chapters 11 through 43 of NFPA 101, shall be resistant to a cigarette ignition (i.e., smoldering) in accordance with one of the following:

(1) The components of the upholstered furniture shall meet the requirements for Class I when tested in accordance with NFPA 260.

(2) Mocked-up composites of the upholstered furniture shall have a char length not exceeding 1\(\frac{1}{2}\) in. (38 mm) when tested in accordance with NFPA 261.

[101:10.3.2.1]

A.12.6.2.1
The Class I requirement associated with testing in accordance with NFPA 260 and the char length of not more than 1½ in. (38 mm) required with testing in accordance with NFPA 261 are indicators that the furniture item or mattress is resistant to a cigarette ignition. A fire that smolders for an excessive period of time without flaming can reduce the tenability within the room or area of fire origin without developing the temperatures necessary to operate automatic sprinklers. [101:A.10.3.2.1]

The test results from NFPA 260 and from NFPA 261 are suitable for classification purposes but should not be used as input into fire models because they are not generated in units suitable for engineering calculations. [101:A.10.3.2.1]

Until recently Traditionally, NFPA 260 was equivalent to ASTM E1353, Standard Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture, and NFPA 261 was equivalent to ASTM E1352, Standard Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies. However, that changed when NFPA 260 and NFPA 261 adopted the new NIST standard reference material (SRM 1196) as the igniting cigarette and ASTM E1352 and ASTM E1353 did not, meaning that ASTM E1352 and ASTM E1353 use were using commercial cigarettes that are low-ignition propensity and have a low likelihood of properly assessing smoldering potential. The 2016 editions of ASTM E1352 and ASTM E1353 adopted the NIST SRM 1196 cigarette as the igniting cigarette, making them, once more, equivalent to NFPA 261 and NFPA 260, respectively. [101:A.10.3.2.1]

12.6.2.2* Rate of Heat Release Testing of Upholstered Furniture.

A.12.6.3.1 A.12.6.2.2
The intent of the provisions of 12.6.3.1 12.6.2.2 is as follows:

1. The peak heat release rate of not more than 80 kW by a single upholstered furniture item was chosen based on maintaining a tenable environment within the room of fire origin, and the sprinkler exception was developed because the sprinkler system helps to maintain tenable conditions, even if the single upholstered furniture item were to have a peak rate of heat release in excess of 80 kW.

2. The total heat release of not more than 25 MJ by the single upholstered furniture item during the first 10 minutes of the test was established as an additional safeguard to protect against the adverse conditions that would be created by an upholstered furniture item that released its heat in other than the usual measured scenario, and the following should also be noted:
   a. During the test for measurement of rate of heat release, the instantaneous heat release value usually peaks quickly and then quickly falls off, so as to create a triangle-shaped curve.
   b. In the atypical case, if the heat release were to peak and remain steady at that elevated level, as opposed to quickly falling off, the 80 kW limit would not ensure safety.
   c. Only a sprinkler exception is permitted in lieu of the test because of the ability of the sprinkler system to control the fire.

Actual test results for heat, smoke, and combustion product release from ASTM E1537, Standard Test Method for Fire Testing of Upholstered Furniture, might be suitable for use as input into fire models for
performance-based design. Furthermore, California Technical Bulletin 133, “Flammability Test Procedure for Seating Furniture for Use in Public Occupancies,” includes pass/fail criteria for a single upholstered furniture item of 80 kW peak heat release rate and 25 MJ total heat release over the first 10 minutes of the test.

12.6.3.2.2.1*
Where required by the applicable provisions of this Code, upholstered furniture and other seating furniture, unless the furniture is located in a building protected throughout by an approved automatic sprinkler system, shall have limited rates of heat release when tested in accordance with ASTM E1537, Standard Test Method for Fire Testing of Upholstered Furniture, as follows:

1. The peak rate of heat release for the single furniture item shall not exceed 80 kW.
2. The total heat released by the single furniture item during the first 10 minutes of the test shall not exceed 25 MJ.

12.6.3 Mattresses.

12.6.2.2.2*
When tests are conducted in accordance with 12.6.2.2, the formation of flaming droplets during the test shall be reported.

12.6.3 *Rate of Heat Release Testing of Upholstered Furniture and Mattresses.

12.6.3.2 * Rate of Heat Release and Mass Loss Testing of Mattresses.
Where required by the applicable provisions of this Code, mattresses shall comply with 12.6.3.2.1 or 12.6.3.2.2, unless the mattress is located in a building protected throughout by an approved automatic sprinkler system.
12.6.3.2.1
The mattress shall have limited rates of heat release when tested in accordance with ASTM E1590, *Standard Test Method for Fire Testing of Mattresses*, as follows:

1. The peak rate of heat release for the *single* mattress shall not exceed 100 kW.
2. The total heat released by the mattress during the first 10 minutes of the test shall not exceed 25 MJ.

[101:10.3.3.2.1]

12.6.3.2.2
The mattress shall have a mass loss not exceeding 15 percent when tested in accordance with the fire test in Appendix A3 of ASTM F1085, *Standard Specification for Mattress and Box Springs for Use in Berths and in Marine Vessels*. [101:10.3.3.2.2]

12.6.3.2.3
When tests are conducted in accordance with 12.6.3.2, the formation of flaming droplets during the test shall be reported. [101:10.3.3.2.3]

12.6.4 * Explosive or Highly Flammable Furnishings or Decorations.*
Furnishings or decorations of an explosive or highly flammable character shall not be used. [101:10.3.4]

A.12.6.4
Natural cut Christmas trees that are not effectively treated to improve fire performance, ordinary crepe paper decorations, and pyroxylin plastic decorations might be classified as highly flammable. See 12.6.9 for requirements for combustible artificial decorative vegetation. See Section 12.6.9, for provisions for natural cut Christmas trees. Christmas trees that are not effectively flame retardant treated, ordinary crepe paper decorations, and pyroxylin plastic decorations might be classified as highly flammable. [101:A.10.3.4]

12.6.5 *Fire-Retardant Coatings.*
Fire-retardant coatings shall be maintained to retain the effectiveness of the treatment under service conditions encountered in actual use. [101:10.3.5]

12.6.6 *Foamed Plastics.*
Where required by the applicable provisions of this Code, furnishings and contents made with foamed plastic materials that are unprotected from ignition shall have a heat release rate not exceeding 100 kW when tested in accordance with UL 1975, *Fire Tests for Foamed Plastics Used for Decorative Purposes*, or when tested in accordance with NFPA 289 using the 20 kW ignition source. [101:10.3.6]

12.6.7 *Lockers.*
Lockers shall be considered interior finish and shall comply with the requirements of 12.5.5.8. [101:10.3.7]
12.6.7.1 Combustible Lockers.
Where lockers constructed of combustible materials other than wood are used, the lockers shall be considered interior finish and shall comply with Section 12.5, except as permitted by 12.6.7.2. [101:10.3.7.1]

12.6.7.2 Wood Lockers.
Lockers constructed entirely of wood and of noncombustible materials shall be permitted to be used in any location where interior finish materials are required to meet a Class C classification in accordance with 12.5.3. [101:10.3.7.2]

12.6.8 Containers for Waste, or Linen.

12.6.8.2
Where required by Chapters 11 through 43 of NFPA 101, newly introduced metal wastebaskets and other metal waste, or linen containers with a capacity of 20 gal (75.7 L) or more shall be listed in accordance with UL 1315, Safety for Metal Waste Paper Containers, and shall be provided with a noncombustible lid. [101:10.3.8.2]

10.1312.6.9 Combustible Vegetation.

10.13.12.6.9.1
Combustible vegetation, including natural cut Christmas trees, shall be in accordance with Section 10.1312.6.9.

10.13.112.6.9.1.1
Christmas tree placement within buildings shall comply with Table 10.13.112.6.9.1.1.

Table 10.13.112.6.9.1.1 Provisions for Christmas Trees by Occupancy

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>No Trees Permitted</th>
<th>Cut Tree Permitted With Automatic Sprinkler Systems</th>
<th>Cut Tree Permitted Without Automatic Sprinkler Systems</th>
<th>Balled Tree Permitted</th>
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<tr>
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<td>Within unit</td>
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### Occupancy

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<th>Occupancy</th>
<th>No Trees Permitted</th>
<th>Cut Tree Permitted With Automatic Sprinkler Systems</th>
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<th>Balled Tree Permitted</th>
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<td>X</td>
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</tr>
<tr>
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<td>Detention and correctional</td>
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<tr>
<td>Storage</td>
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</table>

**10.13.212.6.9.2**

In any occupancy, limited quantities of combustible vegetation shall be permitted where the AHJ determines that adequate safeguards are provided based on the quantity and nature of the combustible vegetation.

**10.13.4-12.6.9.3**

Vegetation and Christmas trees shall not obstruct corridors, exit ways, or other means of egress.

**10.13.812.6.9.4**

Combustible vegetation and natural cut Christmas trees shall not be located near heating vents or other fixed or portable heating devices that could cause it to dry out prematurely or to be ignited.

**10.13.3.112.6.9.5.1**

**Provisions for Fire Retardance for Flammability of Combustible Artificial Vegetation.**
Combustible artificial decorative vegetation and artificial Christmas trees shall meet one of the following:

1. The flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701
2. Tested in accordance with NFPA 289, using the 20 kW ignition source
3. Tested in accordance with UL 1975, Fire Tests for Foamed Plastics Used for Decorative Purposes, and shall have a maximum heat release rate of 100 kW
4. Tested in accordance with UL 2358, Outline of Investigation for Fire Tests of Pre-Lit Artificial Seasonal Use Trees and Other Seasonal Decorative Items
5. Made of noncombustible materials

(2) A maximum heat release rate of 100 kW when tested to NFPA 289, using the 20 kW ignition source

**10.13.3.2-12.6.9.5.2**

Each individual artificial decorative vegetation item shall be labeled to demonstrate compliance with **10.13.3.4-12.6.9.5.1** in an approved manner.

**10.13.9-12.6.9.6** Provisions for Natural Cut Trees.

**10.13.9.1-12.6.9.6.1**

Where a natural cut tree is permitted, the bottom end of the trunk shall be cut off with a straight fresh cut at least 1/2 in. (13 mm) above the end prior to placing the tree in a stand to allow the tree to absorb water.

**10.13.9.2-12.6.9.6.2**

The tree shall be placed in a suitable stand with water.

**10.13.9.3-12.6.9.6.3**

The water level shall be maintained above the fresh cut and checked at least once daily.

**10.13.9.4-12.6.9.6.4**

The tree shall be removed from the building immediately upon evidence of dryness.

**12.6.9.6.5 Fire-Retardant Treatments for Natural Cut Christmas Trees.**

Where fire-retardant treatments are applied to natural cut Christmas trees, the fire-retardant treatment shall comply with both Test Method 1 and Test Method 2 of ASTM E3082, Standard Test Methods for Determining the Effectiveness of Fire Retardant Treatments for Natural Christmas Trees. **[101:10.3.9.2]**

**12.6.9.7 Electrical Equipment.**
Electrical wiring and luminaires used on natural vegetation shall be listed for that application.

Electrical lights shall be prohibited on metal artificial trees.

Candles and open flames such as from candles, lanterns, kerosene heaters, and gas-fired heaters shall not be located on or near combustible artificial decorative vegetation, Christmas trees, or other similar combustible materials.

Candles and open flames shall not be used on or near natural vegetation.

Walls used as fire barriers shall comply with Chapter 7 of NFPA 221. The NFPA 221 limitation on percentage width of openings shall not apply to fire barrier walls.


Fire resistance–rated glazing complying with 12.7.5, where not installed in a door, is considered a wall, not an opening protective.

Interior walls and partitions of nonsymmetrical construction shall be evaluated from both directions and assigned a fire resistance rating based on the shorter duration obtained in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Construction and Materials. When the wall is tested with the least fire-resistant side exposed to the furnace, the wall shall not be required to be subjected to tests from the opposite side.
12.7.6.2.1
Fire protection ratings for products required to comply with 12.7.6 shall be as determined and reported by a nationally recognized testing agency in accordance with NFPA 252; NFPA 257; UL 10B, *Fire Tests of Door Assemblies*; or UL 10C, *Positive Pressure Fire Tests of Door Assemblies*; NFPA 257; or UL 9, *Fire Tests of Window Assemblies*. [101:8.3.3.2.1]

12.7.6.2.2 *
The minimum fire rating for opening protectives in fire barriers, fire-rated smoke barriers, and fire-rated smoke partitions shall be in accordance with Table 12.7.6.2.2, except as otherwise permitted in 12.7.6.2.3 or 12.7.6.2.4. [101:8.3.3.2.2]

Table 12.7.6.2.2 Minimum Fire Protection Ratings for Opening Protectives in Fire-Resistance-Rated Assemblies and Fire-Rated Glazing Markings

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevator hoist ways</td>
<td>2 1/2</td>
<td>155 in.²</td>
<td>D-H-90 or D-H-W-90</td>
<td>NP</td>
<td>NP</td>
<td>D-H-W-120</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>155 in.²</td>
<td>D-H-60 or D-H-W-60</td>
<td>NP</td>
<td>NP</td>
<td>D-H-W-60</td>
<td>NP</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Elevator or lobby (per 7.2.1 3.4 of NFPA 101)</th>
<th>1/2</th>
<th>1/2</th>
<th>85 in.</th>
<th>D-20 or D-W-20</th>
<th>1/2</th>
<th>1/2</th>
<th>D-H-20</th>
<th>D-W-20</th>
<th>1/2</th>
<th>1/2</th>
<th>OH-20</th>
<th>W-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevator or lobby (per 7.2.1 3.4 of NFPA 101)</td>
<td>1</td>
<td>1</td>
<td>≥100 in.</td>
<td>≤100 in.</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>D-H-W-60</td>
<td>NP</td>
<td>W-60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevator or lobby (per 7.2.1 3.4 of NFPA 101)</td>
<td>≥100 in.</td>
<td>&gt;100 in.</td>
<td>≤10 in.²</td>
<td>≤10 in.²</td>
<td>NP</td>
<td>2</td>
<td>NP</td>
<td>D-H-W-120</td>
<td>NP</td>
<td>2</td>
<td>NP</td>
<td>W-120</td>
</tr>
<tr>
<td>Elevator or lobby (per 7.2.1 3.4 of NFPA 101)</td>
<td>≥100 in.</td>
<td>&gt;100 in.</td>
<td>≤10 in.²</td>
<td>≤10 in.²</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>D-H-W-60</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>W-60</td>
</tr>
<tr>
<td>Elevator or lobby (per 7.2.1 3.4 of NFPA 101)</td>
<td>≥100 in.</td>
<td>&gt;100 in.</td>
<td>≤10 in.²</td>
<td>≤10 in.²</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>D-H-W-60</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>W-60</td>
</tr>
<tr>
<td>Elevator or lobby (per 7.2.1 3.4 of NFPA 101)</td>
<td>≥100 in.</td>
<td>&gt;100 in.</td>
<td>≤10 in.²</td>
<td>≤10 in.²</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>D-H-W-60</td>
<td>NP</td>
<td>1</td>
<td>NP</td>
<td>W-60</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Vertical shafts</th>
<th>3</th>
<th>3</th>
<th>100 in.²</th>
<th>NP</th>
<th>3</th>
<th>NP</th>
<th>D-H-W-180</th>
<th>NP</th>
<th>3</th>
<th>NP</th>
<th>W-180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire barriers</td>
<td>2</td>
<td>1/2</td>
<td>Maximum size tested</td>
<td>D-H-90 or D-H-W-90</td>
<td>NP</td>
<td>2</td>
<td>NP</td>
<td>D-H-W-120</td>
<td>NP</td>
<td>2</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1/4</td>
<td>Maximum size tested</td>
<td>D-H-45 or D-H-W-45</td>
<td>1/4</td>
<td>1/4</td>
<td>D-H-W-45</td>
<td>1/4</td>
<td>1/4</td>
<td>OH-45</td>
<td>W-60</td>
</tr>
<tr>
<td></td>
<td>1/2</td>
<td>1/2</td>
<td>Maximum size tested</td>
<td>D-20 or D-W-20</td>
<td>1/2</td>
<td>1/2</td>
<td>D-H-20</td>
<td>1/2</td>
<td>1/2</td>
<td>OH-20</td>
<td>W-30</td>
</tr>
<tr>
<td>Horizontal exits</td>
<td>2</td>
<td>1/2</td>
<td>Maximum size</td>
<td>D-H-90 or D-H-W-120</td>
<td>NP</td>
<td>2</td>
<td>NP</td>
<td>D-H-W-120</td>
<td>NP</td>
<td>2</td>
<td>NP</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Hor. exits served by bridges between buildings</td>
<td>1 Max size tested</td>
<td>1/4</td>
<td>D-H-45 or D-H-W-45</td>
<td>1/4</td>
<td>D-H-45</td>
<td>1/4</td>
<td>OH-45</td>
<td>W-120</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Exit access corridors</td>
<td>Max size tested</td>
<td>1/4</td>
<td>D-20 or D-W-20</td>
<td>1/4</td>
<td>D-H-45</td>
<td>1/4</td>
<td>OH-45</td>
<td>W-60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Smoke Barriers</td>
<td>Max size tested</td>
<td>1/3</td>
<td>D-20 or D-W-20</td>
<td>1/3</td>
<td>D-H-45</td>
<td>1/3</td>
<td>OH-45</td>
<td>W-60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Smoke partitions</td>
<td>Max size tested</td>
<td>1/3</td>
<td>D-20 or D-W-20</td>
<td>1/3</td>
<td>D-H-45</td>
<td>1/3</td>
<td>OH-45</td>
<td>W-30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI units, 1 in.² = 0.00064516 m².

NP: Not permitted.

*aFire resistance-rated glazing tested to ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building Construction and Materials, shall be permitted in the maximum size tested. (See 12.7.6.6.8.)

*bFire-rated glazing in exterior windows shall be marked in accordance with Table 12.7.6.6.3.
See ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, for additional information.

See ASME A17.3, Safety Code for Existing Elevators and Escalators, for additional information.

Maximum area of individual exposed lights shall be 1296 in.² (0.84 m²) with no dimension exceeding 54 in. (1.37 m) unless otherwise tested. [80:Table 4.4.5, Note b; and 80:4.4.5.1]

Fire doors are not required to have a hose stream test per UL 10B, Fire Tests of Door Assemblies; or UL 10C, Positive Pressure Fire Tests of Door Assemblies.

For residential board and care, see 32.2.3.1 and 33.2.3.1 of NFPA 101.

[A.12.7.6.2.2]

A.12.7.6.2.2

Longer ratings might be required where opening protective are provided for property protection as well as life safety. NFPA 80 should be consulted for standard practice in the selection and installation of fire door assemblies and fire window assemblies. [101:A.8.3.3.2.2]

A vision panel in a fire door is not a fire window, and, thus, it is not the intent of the “NP” notations in the “Fire Window Assemblies” column of Table 12.7.6.2.2 to prohibit vision panels in fire doors. [101:A.8.3.3.2.2]

Table 12.7.6.2.2 with regard to glazing is intended for new construction and could have limited application to existing glazing installations. For example, existing vision panels of 100 in.² (0.065 m²) of wired glass in 60-minute and 90-minute doors and existing vision panels of 1296 in.² (0.84 m²) wired glass in doors 45 minutes or less have been accepted. [101:A.8.3.3.2.2]

Historically, installations of wired glass did not require marking. There could be existing installations of other glazing products used as opening protective (e.g., vision panels, side lights, or transom panels) that also might not have markings. It is the building owner’s responsibility to provide documentation acceptable to the AHJ regarding the product used and its compliance with the applicable provisions of this Code. [101:A.8.3.3.2.2]

Existing fire windows, where permitted, were traditionally allowed to have up to 1296 in.² (0.84 m²) of wired glass per panel. [101:A.8.3.3.2.2]

12.7.6.2.4

Where a 20-minute fire-protection-rated door is required in existing buildings, an existing 1\frac{1}{4} in. (44 mm) solid-bonded wood-core door, an existing steel-clad (tin-clad) wood door, or an existing solid-core steel door with positive latch and closer shall be permitted, unless otherwise specified by Chapters 11 through 43 of NFPA 101. [101:8.3.3.2.4]

12.7.6.2.5

Existing doors permitted by 12.7.6.2.4 shall have a positive latch and a closer. [101:8.3.3.2.5]
### 12.7.6.2.65

Openings required to have a fire protection rating by Table 12.7.6.2.2 shall be protected by approved, listed, and labeled fire door assemblies and fire window assemblies and their accompanying hardware, including all frames, closing devices, anchorage, and sills in accordance with the requirements of NFPA 80, except as otherwise specified in NFPA 101. [101:8.3.3.2.65]

### A.12.7.6.3

Some door assemblies have been tested to meet the conditions of acceptance of ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*. Where such assemblies are used, the provisions of 12.7.5 should be applied instead of those of 12.7.6.3. [101:A.8.3.3.3]

In existing installations, steel door frames that are well set in the wall might be judged as acceptable even if the frame label is not legible. [101:A.8.3.3.3]

### 12.7.6.3.1*

*Fire-Required fire* door assemblies shall be installed, inspected, tested, and maintained in accordance with NFPA 80. [101:8.3.3.3.1]

### A.12.7.6.3.1

Where a door or door frame is not required to be fire protection rated and is equipped with a fire protection listing label, the door and the door frame are not required to comply with NFPA 80. [101:8.3.3.3.1]

### 12.7.6.3.5

Unless otherwise specified, fire doors shall be self-closing or automatic-closing in accordance with 14.5.4. [101:8.3.3.6]

### 12.7.6.4 Floor Fire Door Assemblies.

#### 12.7.6.4.1

Floor fire door assemblies used to protect openings in fire-resistance-rated floors shall be tested in accordance with NFPA 288 and shall achieve a fire resistance rating not less than the assembly being penetrated. [101:8.3.3.4.1]

### 12.7.6.6.3

New fire protection-rated glazing shall be marked in accordance with Table 12.7.6.6.3 and Table 12.7.6.2.2, and such marking shall be permanently affixed. [101:8.3.3.6.3]

#### Table 12.7.6.6.3 Marking Fire-Rated Glazing Assemblies

<table>
<thead>
<tr>
<th>Fire Test Standard</th>
<th>Marking</th>
<th>Definition of Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM E119 or UL 263</td>
<td>W</td>
<td>Meets wall assembly criteria</td>
</tr>
</tbody>
</table>
NFPA 257 or UL 9

<table>
<thead>
<tr>
<th>OH</th>
<th>Meets fire window assembly criteria, including the hose stream test</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Meets fire door assembly criteria</td>
</tr>
<tr>
<td>H</td>
<td>Meets fire door assembly hose stream test</td>
</tr>
<tr>
<td>T</td>
<td>Meets 450°F (232°C) temperature rise criteria for 30 minutes</td>
</tr>
<tr>
<td>XXX</td>
<td>The time, in minutes, of fire resistance or fire protection rating of the glazing assembly</td>
</tr>
</tbody>
</table>

12.7.6.6.4

New fire resistance-rated glazing shall be marked in accordance with Table 12.7.6.6.3 and Table 12.7.6.2.2, and such marking shall be permanently affixed. [101]:8.3.3.6.4

12.7.6.6.5

Fire protection-rated glazing shall be permitted in fire barriers having a required fire resistance rating of 1 hour or less and shall be of an approved type with the appropriate fire protection rating for the location in which the barriers are installed. [101]:8.3.3.6.5

12.7.6.6.7

Fire protection-rated glazing in fire door assemblies, other than in existing fire-rated door assemblies, shall be of a design that has been tested to meet the conditions of acceptance of NFPA 252, UL 10B, *Fire Tests of Door Assemblies*, or UL 10C, *Positive Pressure Fire Tests of Door Assemblies*. [101]:8.3.3.6.7

12.7.6.6.8

Fire resistance-rated glazing tested in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, shall be permitted in fire doors and fire window assemblies in accordance with their listings. [101]:8.3.3.6.8

12.7.6.6.9

Nonsymmetrical fire protection-rated glazing systems shall be tested with each face exposed to the furnace, and the assigned fire protection rating shall be that of the shortest duration obtained from the two tests conducted in compliance with NFPA 257; or UL 9, *Fire Tests of Window Assemblies*. [101]:8.3.3.6.9

12.7.6.6.10

The total combined area of fire protection-rated glazing in fire window assemblies and fire-rated door assemblies used in fire barriers shall not exceed 25 percent of the area of the fire barrier that is common with any room, unless the installation meets one of the following criteria:

1. The installation is an existing fire window installation of wired glass and or other fire protection-rated glazing materials in approved frames. [101]:8.3.3.10

2. The fire protection-rated glazing material is installed in approved existing frames. [101]:8.3.3.10
12.7.6.6.11
Existing installations of wired glass of 1/4 in. (6.3 mm) thickness and labeled previously approved for fire protection purposes shall be permitted to be used in approved opening protectives, provided that the maximum size specified by the listing is not exceeded. [101:8.3.3.6.11]

12.7.8.1.1
The provisions of 12.7.8 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations in fire walls, fire barrier walls, and fire-resistance-rated horizontal assemblies. [101:8.3.4.1.1]

12.7.8.1.2
The provisions of 12.7.8 shall not apply to approved existing materials and methods of construction used to protect existing through-penetrations and existing membrane penetrations in fire walls, fire barrier walls, or fire-resistance-rated horizontal assemblies, unless otherwise required by Chapters 11 through 43 of NFPA 101. [101:8.3.4.1.2]

12.7.8.1.3
Penetrations shall be protected in accordance with a tested system, and installed and maintained in accordance with the manufacturer’s instructions. [101:8.3.4.1.3]

A.12.7.8.2
Firestop materials become systems when installed to the listed firestop system design from an accredited testing laboratory. Installation of firestop materials to the listed system should meet all limitations of the system. [101:A.8.3.4.2]

There are management-based contractor approval or qualification programs offered by third-party, independent companies that quantifiably qualify a company to install firestop materials that become systems after proper installation. In each program, there is an industry firestop exam that gives the company a basis to appoint a “Designated Responsible Individual.” [101:A.8.3.4.2]

Then, the third-party firm audits the firestop company’s product and systems documentation records in conjunction with the company’s management system operational policies and procedures to verify company compliance—does as it says it does. An audit also takes place on a project site to verify that the management system is working. [101:A.8.3.4.2]

Where the configuration of a penetrating item or group of items is such that a listed system is determined to be nonexistent and reconfiguration of the penetrations or fire-resistance-rated assembly is determined to be impractical or impossible, alternative methods for maintaining the integrity of the required fire resistance rating of the assembly should be permitted to be established using an engineering analysis based on a comparison of listed systems prepared by a manufacturer’s technical representative of the systems specified, by the laboratory that conducted the original test, or by a professional engineer. [101:A.8.3.4.2]

Independent inspection paid for by the owner is in many specifications and referenced in this appendix using ASTM E2174 and ASTM E2393, *Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers*. As a result, there is an accreditation program available for firestop special inspection agencies. \[101:A.8.3.4.2\]

**12.7.8.2.2 Testing.**

The firestop system or device shall be tested in accordance with ASTM E814, *Standard Test Method for Fire Tests of Through-Penetration Fire Stop Systems*, or UL 1479, *Fire Tests of Through-Penetration Firestops*, at a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) between the exposed and the unexposed surface of the test assembly. \[101:8.3.4.2.2\]

**12.7.8.2.3 F Ratings.**

Firestop systems and devices shall have a minimum 1-hour F rating, but and not less than the required fire resistance rating of the fire barrier penetrated. \[101:8.3.4.2.3\]

**12.7.8.2.4.1**

Penetrations in fire-resistance-rated horizontal assemblies shall have a T rating of not less than 1 hour, and not less than the fire resistance rating of the horizontal assembly. \[101:8.3.4.2.4.1\]

**12.7.8.2.5.1**

The requirements of 12.7.8.2 shall not apply where otherwise permitted by any one of the following:

2. Where penetrations through floors are enclosed in a shaft enclosure designed as a fire barrier
3. Where concrete, grout, or mortar has been used to fill the annular spaces around cast-iron, copper, or steel piping, conduit, or tubing that penetrates one or more concrete or masonry fire-resistance-rated assemblies and all of the following applies:
   a. The nominal diameter of each penetrating item does not exceed 6 in. (150 mm),
   b. The opening size does not exceed 1 ft² (0.09 m²).
   c. The thickness of the concrete, grout, or mortar is the full thickness of the assembly.
4. Where penetration is limited to one floor, the firestopping material is capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions of ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Materials* under a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) at the location of the penetration for the time period equivalent to the required fire resistance rating of the assembly penetrated, and the firestopping materials are used with the following penetrating items:
(a) Steel, ferrous, or copper cables
(b) Cable or wire with steel jackets
(c) Cast-iron, steel, or copper pipes
(d) Steel conduit or tubing

[101:8.3.4.2.5.1]

**12.7.8.2.5.2**
The maximum nominal diameter of the penetrating item, as indicated in 12.7.8.2.5.1(4)(a) through 12.7.8.2.5.1(4)(d), shall not be greater than 4 in. (100 mm) and shall not exceed an aggregate 100 in.² (64,520 mm²) opening in any 100 ft² (9.3 m²) of floor or wall area. [101:8.3.4.2.5.2]

**12.7.8.6.1**
Where piping penetrates a fire-fire-resistance-rated wall or floor assembly, combustible piping shall not connect to noncombustible piping within 36 in. (915 mm) of the firestop system or device unless it can be demonstrated that the transition will not reduce the fire resistance rating, except in the case of previously approved installations. [101:8.3.4.6.1]

**12.7.8.7.2**
The firestop system or device shall be tested in accordance with ASTM E814, *Standard Test Method for Fire Tests of Through-Penetration Fire Stop Systems*, or UL 1479, *Fire Tests of Through-Penetration Firestops*, at a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) between the exposed and the unexposed surface of the test assembly, unless one of the following conditions applies:

1. Membrane penetrations of ceilings that are not an integral part of a fire-fire-resistance-rated floor/ceiling or roof/ceiling assembly.
2. Membrane penetrations of steel, ferrous, or copper conduits, piping, or tubing, and steel electrical outlet boxes and wires, or combustion vents or exhaust vents where the annular space is protected with an approved material, and the aggregate area of the openings does not exceed 100 in.² (64,520 mm²) in any 100 ft² (9.3 m²) of ceiling area.
3. Electrical outlet boxes and fittings, provided that such devices are listed for use in fire-fire-resistance-rated assemblies and are installed in accordance with their listing.
4. The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate.

[101:8.3.4.7.2]

**12.7.8.7.3**
Where walls or partitions are required to have a minimum 1-hour fire resistance rating, recessed fixtures shall be installed in the wall or partition in such a manner that the required fire resistance is not reduced, unless one of the following criteria is met:

1. Any steel electrical box not exceeding 16 in.² (10,300 mm²) in area shall be permitted where the aggregate area of the openings provided for the boxes does not exceed 100 in.² (64,520 mm²) in
any 100 ft² (9.3 m²) of wall area, and, where outlet boxes are installed on opposite sides of the
wall, the boxes shall be separated by one of the following means:
(a) Horizontal distance of not less than 24 in. (610 mm)
(b) Horizontal distance of not less than the depth of the wall cavity, where the wall cavity is
filled with cellulose loose-fill, rock wool, or slag wool insulation
(c)* Solid fireblocking
(d) Other listed materials and methods

(2) Membrane penetrations for any listed electrical outlet box made of any material shall be
permitted, provided that such boxes have been tested for use in fire-fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.

(3) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate.

(4) Membrane penetrations by electrical boxes of any size or type, which have been listed as part of a wall opening protective material system for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing shall be permitted.

[101:8.3.4.7.3]

A.12.7.8.7.3(1)(c)
Criteria associated with fireblocking can be found in the building code of NFPA 5000.
[101:A.8.3.4.7.3(1)(c)]

12.7.8.8 Ducts and Air-Transfer Openings.
Openings in fire barriers for air-handling ductwork or air movement shall be protected in accordance with 11.2.1. [101:8.3.4.8]

12.7.9.1.1
The provisions of 12.7.9 shall govern the materials and methods of construction used to protect joints in fire barriers, in between fire barriers, and at the perimeter of fire barriers or where fire barriers meet other fire barriers, the floor or roof deck above, or the outside walls. [101:8.3.5.1.1]

12.7.9.2.1 *
Joints made within or at the perimeter of fire barriers, between fire-fire-resistance-rated assemblies, or where fire barriers meet other fire barriers, the floor or roof deck above, or the outside walls shall be protected with a joint system that is designed and tested to prevent the spread of fire for a time period equal to that of the assembly in which the joint is located. [101:8.3.5.2.1]

A.12.7.9.2.1
Materials used to protect joints become systems when installed to the listed joint system design from an accredited testing laboratory. Installation of joint materials to the listed system should meet all limitations of the system. [101:A.8.3.5.2.1]

There are management-based contractor approval or qualification programs offered by third-party, independent companies that quantifiably qualify a company to install firestop
materials that become systems after proper installation. In each program, there is an industry firestop exam that gives the company a basis to appoint a “Designated Responsible Individual.” [101:A.8.3.5.2.1]

Then, the third-party firm audits the firestop company’s product and systems documentation records in conjunction with the company’s management system operational policies and procedures to verify company compliance. An audit also takes place on a project site to verify that the management system is working. [101:A.8.3.5.2.1]

Where the configuration of a joint is such that a listed system is determined to be nonexistent and reconfiguration of the joint or fire-resistance-rated assembly is determined to be impractical or impossible, alternative methods for maintaining the integrity of the required fire resistance rating of the assembly should be permitted to be established using an engineering analysis based on a comparison of listed systems prepared by a manufacturer’s technical representative of the systems specified, by the laboratory that conducted the original test, or by a professional engineer. [101:A.8.3.5.2.1]

ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops, provides guidance for the inspection of through-penetration firestop systems tested in accordance with ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops, and UL 1479, Fire Tests of Through-Penetration Firestops. On-site inspection of firestopping is important in maintaining the integrity of any vertical or horizontal fire barrier. Two standard practice documents were developed with the ASTM process to allow inspections of through-penetration firestops, joints, and perimeter fire barrier systems. ASTM E2393, Standard Practice for On-Site Inspection of Installed Fire Resistant Joint Systems and Perimeter Fire Barriers, provides guidance for the inspection of fire-resistive joints and perimeter fire barrier joint systems tested in accordance with the requirements of ASTM E1966, Standard Test Method for Fire-Resistive Joint Systems, or with UL 2079, Tests for Fire Resistance of Building Joint Systems. ASTM E2393 contains a standardized report format, which would lead to greater consistency for inspections. [101:A.8.3.5.2.1]

Independent inspection paid for by the owner is in many specifications and referenced in this annex using ASTM E2174 and ASTM E2393, Standard Practice for On-Site Inspection of Installed Fire Resistant Joint Systems and Perimeter Fire Barriers. As a result, there is an accreditation program available for firestop special inspection agencies. Independent inspection paid for by the owner is in many specifications and referenced in this annex using ASTM E2393. As a result, there is an accreditation program available for firestop special inspection agencies. [101:A.8.3.5.2.1]

12.7.9.2.6
All joint systems shall be tested at their maximum joint width in accordance with the requirements of ASTM E1966, Standard Test Method for Fire-Resistive Joint Systems, or UL 2079, Tests for Fire Resistance of Building Joint Systems, under a minimum positive pressure differential of 0.01 in. water column (2.5 N/m²) for a time period equal to that of the assembly. [101:8.3.5.2.6]

12.7.9.2.8
Wall assemblies shall be subjected to a hose stream test in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, or UL 263, Fire Tests of Building
Construction and Materials or UL 263. [101:8.3.5.2.8]

12.7.9.3
Joints made between a fire barrier and a non-fire-resistance-rated floor or roof sheathing, slab, or deck above shall be protected by an approved continuity head of wall joint system installed as and tested in accordance with ASTM E2837, Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies, and the system shall have an F rating and T rating of not less than the required fire resistance rating of the fire barrier. [101:8.3.5.3]

A.12.7.9.4
The provisions of 12.7.9.4 are intended to restrict the interior vertical passage of flame and hot gases from one floor to another at the location where the floor intersects the exterior wall assembly. The requirements of 12.7.9.4.8.3.5.4 mandate sealing the opening between a floor and an exterior wall assembly to provide the same fire performance as that required for the floor. ASTM E2307, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-Story Test Apparatus, is a test method for evaluating the performance of perimeter fire barrier systems. Some laboratories have tested and listed perimeter fire barrier systems essentially in accordance with the ASTM method. The ASTM test method evaluates the performance of perimeter fire barrier systems in terms of heat transfer and fire spread inside a building through the floor/exterior wall intersection. The current test method does not assess the ability of perimeter fire barrier systems to prevent the spread of fire from story to story via the exterior. However, some laboratories have included additional temperature measurement criteria in their evaluation of the exterior wall and evaluation of vision glass breakage as additional pass/fail criteria in an attempt to at least partially address this “leapfrog” effect. [101:A.8.3.5.4]

12.7.9.4.1
Voids created between the fire-fire-resistance-rated floor assembly and the exterior curtain wall shall be protected with a perimeter joint system that is designed and tested in accordance with ASTM E2307, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Apparatus. [101:8.3.5.4.1]

A.12.8.1
The provision for terminating the smoke partition at the ceiling is not intended to prevent the wall from extending above the ceiling.

Although a smoke partition is intended to limit the free movement of smoke, it is not intended to provide an area that would be free of smoke. [101:A.8.4.1]

A.12.8.2(2)
The provision for terminating the smoke partition at the ceiling is not intended to prevent the wall from extending above the ceiling. [101:A.8.4.2(2)]

An architectural, exposed, suspended-grid acoustical tile ceiling with penetrations for sprinklers, ducted
HVAC supply and return-air diffusers, speakers, and recessed light fixtures is capable of limiting the transfer of smoke. [101:A.8.4.2(2)]

**12.8.3.1**
Doors in smoke partitions shall comply with 12.8.3.2 through 12.8.3.65. [101:8.4.3.1]

**12.8.3.6**
Shutters that protect openings shall be automatic-closing upon operation of approved smoke detectors installed in accordance with the provisions of NFPA 72. [101:8.4.3.6]

**12.8.4.2 Vibration Isolation Equipment or Systems.**
Where vibration isolation of equipment or systems is employed, the vibration restraint(s) shall be located outside of the partition, wall, or floor assembly through which the equipment or systems pass through. [101:8.4.4.2]

*A.12.8.6.2*
An air-transfer opening, as defined in NFPA 90A, is an opening designed to allow the movement of environmental air between two contiguous spaces. [101:A.8.4.6.2]

**12.9.1 *General.**
Where required by Chapters 11 through 43 of NFPA 101, smoke barriers shall be provided to subdivide building spaces for the purpose of restricting the movement of smoke. [101:8.5.1]

*A.12.9.2*
To ensure that a smoke barrier is continuous, it is necessary to seal completely all openings where the smoke barrier abuts other smoke barriers, fire barriers, exterior walls, the floor below, and the floor or ceiling above. It is not the intent to prohibit a smoke barrier from stopping at a fire barrier if the fire barrier meets the requirements of a smoke barrier (that is, the fire barrier is a combination smoke barrier/fire barrier). [101:A.8.5.2]

**12.9.4.2**
Where required by Chapters 11 through 43 of NFPA 101, doors in smoke barriers that are required to be smoke-leakage-rated shall comply with the requirements of 8.2.2.4 of NFPA 101. [101:8.5.4.2]

**12.9.4.3**
Latching hardware shall be required on doors in smoke barriers, unless specifically exempted by Chapters 11 through 43 of NFPA 101. [101:8.5.4.3]

**12.9.5.2.1**
Where a smoke barrier is penetrated by a duct or air-transfer opening, a smoke damper designed and tested in accordance with the requirements of UL 555S, Smoke Dampers, shall be installed. [101:8.5.5.2.1]
12.9.5.2.2

Where a smoke barrier is also constructed as a fire barrier, a combination fire/smoke damper designed and tested in accordance with the requirements of UL 555, Fire Dampers, and UL 555S, Smoke Dampers, shall be installed. [101:8.5.2.2]

12.9.5.3 Smoke Damper Exemptions.

Smoke dampers shall not be required under any of the following conditions:

2. Where ducts or air-transfer openings are part of an engineered smoke control system and the smoke damper will interfere with the operation of a smoke control system.
3. Where the air in ducts continues to move and the air-handling system installed is arranged to prevent recirculation of exhaust or return air under fire emergency conditions.
4. Where the air inlet or outlet openings in ducts are limited to a single smoke compartment.
5. Where ducts penetrate floors that serve as smoke barriers.
6. Where ducts penetrate smoke barriers forming a communicating space separation in accordance with 8.6.6(4)(a) of NFPA 101. [101:8.5.5.3]

12.9.5.4.2

Smoke dampers and combination fire and smoke dampers required by this code shall be inspected, tested, and maintained in accordance with NFPA 105. [101:8.5.5.4.2]

12.9.5.5.2

Smoke and combination fire and smoke dampers in new construction shall be provided with an approved means of access, as follows:

1. The means of access shall be large enough to allow inspection and maintenance of the damper and its operating parts.
2. The access shall not affect the integrity of fire-rated assemblies or smoke barrier continuity.
3. The access openings shall not reduce the fire resistance rating of the assembly.
4. Access doors in ducts shall be tight-fitting and suitable for the required duct construction.
5. Access and maintenance shall comply with the requirements of the mechanical code. [101:8.5.5.5.2]

12.9.5.5.3 Identification.

Access points to fire and smoke dampers in new construction shall be permanently identified by one of the following:

1. A label having letters not less than \( \frac{1}{8} \) in. (13 mm) in height and reading as one of the following:
   a. FIRE/SMOKE DAMPER
   b. SMOKE DAMPER
   c. FIRE DAMPER
2. Symbols as approved by the AHJ.
12.9.5.6 Smoke Damper Ratings.
Smoke damper leakage ratings shall be not less than Class II. Elevated temperature ratings shall be not less than 250°F (140°C). [101:8.5.5.6]

12.9.5.7 Smoke Detectors.

12.9.5.7.1 Required smoke dampers in ducts penetrating smoke barriers shall close upon detection of smoke by approved smoke detectors in accordance with NFPA 72, unless one of the following conditions exists:

(1) The ducts penetrate smoke barriers above the smoke barrier doors, and the door release detector actuates the damper.

(2) Approved smoke detector installations are located within the ducts in existing installations. [101:8.5.5.7.1]

12.9.6.4 Where sprinklers penetrate a single membrane of a fire-resistant-rated assembly in buildings equipped throughout with an approved automatic fire sprinkler system, noncombustible escutcheon plates shall be permitted, provided that the space around each sprinkler penetration does not exceed 1/2 in. (13 mm), measured between the edge of the membrane and the sprinkler. [101:8.5.6.4]

12.9.6.5 In new construction, through-penetrations shall be protected by an approved through-penetration firestop system installed and tested in accordance with the requirements of UL 1479, Fire Tests of Penetration Firestops, for air leakage and shall comply with one of the following:

(1) A maximum 5 ft³/min per ft² (0.025 m³/s per m²) of penetration opening for each through-penetration firestop system

(2) A maximum total cumulative leakage of 50 ft³/min (0.024 m³/s) for any 100 ft² (9.3 m²) of wall area or floor area

Where the penetrating item uses a sleeve to penetrate the smoke barrier, the sleeve shall be securely set in the smoke barrier, and the space between the item and the sleeve shall be filled with a listed system or with a material capable of restricting the transfer of smoke. [101:8.5.6.5]

12.9.6.6 Vibration Isolation Equipment or Systems.
Where vibration isolation of equipment or systems is employed, the vibration restraint(s) shall be located outside of the partition, wall or floor assembly for which the equipment or systems pass through. [101:8.5.6.7]

12.9.7.2 Joints made within, between, or at the perimeter of smoke barriers shall be protected with a joint system that is tested in accordance with the requirements of UL 2079, Tests for Fire Resistance of
Building Joint Systems, for air leakage, and the L rating of the joint system shall not exceed 5 ft²/min per ft (0.00775 m³/s per m) of the joint. Joints made within or at the perimeter of smoke barriers shall be protected with a joint system that is capable of limiting the transfer of smoke. [101:8.5.7.2]

12.9.7.3
Joints made within or between smoke barriers shall be protected with a smoke-tight joint system that is capable of limiting the transfer of smoke. [101:8.5.7.3]

12.9.7.34
Smoke barriers that are also constructed as fire barriers shall be protected with a joint system that is designed and tested to resist the spread of fire for a time period equal to the required fire resistance rating of the assembly and restrict the transfer of smoke in compliance with 12.9.7.2. [101:8.5.7.3]

12.9.7.45
Testing of the joint system in a smoke barrier that also serves as fire barrier shall be representative of the actual installation. [101:8.5.7.4]


13.1.3.1 Basic Testing.
Where required by Chapters 11 through 43 of NFPA 101, installations involving and where two or more integrated fire protection or life safety systems are integrated, the integrated system shall be tested to verify the proper operation and function of such systems in accordance with NFPA 413.1.3.1.1 and 13.1.3.1.2. [101:9.11.4.1]

A.13.1.3
NFPA 4 requires that integrated fire protection and life safety systems be periodically retested as specified in the integrated system test plan. In addition, for existing systems, an integrated system test plan must be developed within 5 years of adoption of NFPA 4. [101:A.9.11.4]

13.1.3.1.1
When a fire protection or life safety system is tested, the response of integrated fire protection and life safety systems shall be verified. [101:A.9.11.4.1.1]

13.1.3.1.2*
After repair or replacement of equipment, required retesting of integrated systems shall be limited to verifying the response of fire protection or life safety functions initiated by repaired or replaced equipment. [101:A.9.11.4.1.2]

13.1.3.2* NFPA 4 Testing.
Where required by 9.3.5 or Chapters 11 through 43 of NFPA 101, the following integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1 and 13.1.3.2.1 through 13.1.3.2.2:

(1) Integrated fire protection and life safety systems in high-rise buildings
(2) Integrated fire protection and life safety systems that include a smoke control system
[101]:9.11.4.2

A.13.1.3.2
It is intended that the requirements in 13.1.3.1.2 be applied to retesting of any integrated systems following repair or replacement of equipment in lieu of applying retesting provisions in NFPA 4.
[101]:A.9.11.4.2

13.1.3.2.1
For new buildings, integrated testing in accordance with NFPA 4 shall be conducted prior to the issuance of a certificate of occupancy. [101]:9.11.4.2.1

13.1.3.2.2
For existing buildings, integrated testing in accordance with NFPA 4 shall be conducted at intervals not exceeding 10 years unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. [101]:9.11.4.2.2

13.2.1.1
The design and installation of standpipe systems shall be in accordance with Section 13.2 and NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

13.2.1.2
Where standpipe and hose systems are installed in combination with automatic sprinkler systems, installation shall be in accordance with the appropriate provisions established by NFPA 13 and NFPA 14. [101]:9.10.2

13.2.2.3
High-rise buildings shall be protected throughout by a Class I standpipe system in accordance with 13.2.2. [101]:11.8.3.2

13.2.2.4
In new assembly occupancies, regular stages over 1000 ft² (93 m²) in area and all legitimate stages shall be equipped with 1 1/2 in. (38 mm) hose lines for first aid fire fighting at each side of the stage. [101]:12.4.6.12.1

13.2.2.4.1
In existing assembly occupancies, stages over 1000 ft² (93 m²) in area shall be equipped with 1 1/2 in. (38 mm) hose lines for first aid fire fighting at each side of the stage. [101]:13.4.6.12.1

13.2.2.4.2
Hose connections shall be in accordance with NFPA 13, unless Class II or Class III standpipes in
13.3.1.5
Sprinkler piping serving hazardous areas as described in 13.3.1.4 shall be provided with an indicating shutoff valve, supervised in accordance with 13.3.1.8 or NFPA 13, and installed in an accessible, visible location between the sprinklers and the connection to the domestic water supply. [101:9.7.1.3]

13.3.1.8.1 *Supervisory Signals.
A.13.3.1.8.1
NFPA 72 provides details of standard practice in sprinkler supervision. Subject to the approval of the AHJ, sprinkler supervision is also permitted to be provided by direct connection to municipal fire departments or, in the case of very large establishments, to a private headquarters providing similar functions. NFPA 72 covers such matters. System components and parameters that are required to be monitored should include, but should not be limited to, control valves, water tank levels and temperatures, tank pressure, and air pressure on dry-pipe valves. [101:A.9.7.2.1]

Where municipal fire alarm systems are involved, reference should also be made to NFPA 1221. [101:A.9.7.2.1]

13.3.2.7.2
Any building containing one or more assembly occupancies where the aggregate occupant load of the assembly occupancies exceeds 300 shall be protected by an approved, supervised automatic sprinkler system in accordance with NFPA 13 as follows (see also 12.1.6, 12.2.6, 12.3.2, and 12.3.6 of NFPA 101):

   (1) Throughout the story containing the assembly occupancy
   (2) Throughout all stories below the story containing the assembly occupancy
   (3) In the case of an assembly occupancy located below the level of exit discharge, throughout all stories intervening between that story and the level of exit discharge, including the level of exit discharge

[101:12.3.5.2]

13.3.2.7.3
The requirements of 13.3.2.7.2 shall not apply to the following:

   (1)* Assembly occupancies consisting of a single multipurpose room of less than 12,000 ft² (1115 m²) that are not used for exhibition or display and are not part of a mixed occupancy
   (2) Gymnasiums, skating rinks, and swimming pools used exclusively for participant sports with no audience facilities for more than 300 persons
   (3)* Locations in stadia and arenas as follows:
       (a) Over the floor areas used for contest, performance, or entertainment, provided that the roof construction is more than 50 ft (15 m) above the floor level, and use is restricted to low fire hazard uses
       (b) Over the seating areas, provided that use is restricted to low fire hazard uses
Over open-air concourses where an approved engineering analysis substantiates the ineffectiveness of the sprinkler protection due to building height and combustible loading.

Locations in unenclosed stadia and arenas as follows:

(a) Press boxes of less than 1000 ft² (93 m²)
(b) Storage facilities of less than 1000 ft² (93 m²) if enclosed with not less than 1-hour fire-resistant-rated construction
(c) Enclosed areas underneath grandstands that comply with 25.3.4

A.13.3.2.7.3(1)

It is the intent to permit a single multipurpose room of less than 12,000 ft² (1115 m²) to have certain small rooms as part of the single room. These rooms could be a kitchen, an office, an equipment room, and the like. It is also the intent that an addition could be made to an existing building without requiring that the existing building be sprinklered, where both the new and existing buildings have independent means of egress and a fire-rated separation is provided to isolate one building from the other.

A school gymnasium with egress independent of, and separated from, the school would be included in this exception, as would a function hall attached to a church with a similar egress arrangement.

A.13.3.2.7.3(3)

Examples of low fire hazard uses include spectator sporting events, concerts, and performances on platforms.

The following uses are not low fire hazard uses: concerts and performances on stages; tradeshows; exhibition and display of combustible items; displays of vehicles, boats, or similar items; or events using open flames or pyrotechnic effects.

13.3.2.7.5 Fire Protection.

Every stage shall be protected by an approved, supervised automatic sprinkler system in compliance with Section 13.3.

13.3.2.7.5.1

Protection shall be provided throughout the stage and in storerooms, workshops, permanent dressing rooms, and other accessory spaces contiguous to stages.

13.3.2.7.5.2

Sprinklers shall not be required for stages 1000 ft² (93 m²) or less in area and 50 ft (15 m) or less in height where the following criteria are met:

(1) Curtains, scenery, or other combustible hangings are not retractable vertically.
(2) Combustible hangings are limited to borders, legs, a single main curtain, and a single backdrop.

13.3.2.7.5.3
Sprinklers shall not be required under stage areas less than 48 in. (1220 mm) in clear height that are used exclusively for chair or table storage and lined on the inside with \( \frac{5}{8} \) in. (16 mm) Type X gypsum wallboard or the approved equivalent. [101:12.4.76.10.3]

13.3.2.8.1
Where the occupant load exceeds 100, the following assembly occupancies shall be protected throughout by an approved, supervised automatic sprinkler system in accordance with NFPA 13.

(1) Dance halls
(2) Discotheques
(3) Nightclubs
(4) Assembly occupancies with festival seating

13.3.2.8.3
The sprinklers specified by 13.3.2.8.2 shall not be required where otherwise permitted in the following locations:

(1) Locations in stadia and arenas as follows:
   (a) Over the floor areas used for contest, performance, or entertainment
   (b) Over the seating areas
   (c) Over open-air concourses where an approved engineering analysis substantiates the ineffectiveness of the sprinkler protection due to building height and combustible loading

(2) Locations in unenclosed stadia and arenas as follows:
   (a) Press boxes of less than 1000 ft\(^2\) (93 m\(^2\))
   (b) Storage facilities of less than 1000 ft\(^2\) (93 m\(^2\)) if enclosed with not less than 1-hour fire-rated construction
   (c) Enclosed areas underneath grandstands that comply with 25.3.4

13.3.2.8.5 Fire Protection.
Every stage shall be protected by an approved automatic sprinkler system in compliance with Section 13.3. [101:13.4.76.10]

13.3.2.8.5.1
Protection shall be provided throughout the stage and in storerooms, workshops, permanent dressing rooms, and other accessory spaces contiguous to such stages. [101:13.4.76.10.1]
13.3.2.8.5.2
Sprinklers shall not be required for stages 1000 ft² (93 m²) or less in area where the following criteria are met:

(1) Curtains, scenery, or other combustible hangings are not retractable vertically.
(2) Combustible hangings are limited to borders, legs, a single main curtain, and a single backdrop.

[101:13.4.76.10.2]

13.3.2.8.5.3
Sprinklers shall not be required under stage areas less than 48 in. (1220 mm) in clear height that are used exclusively for chair or table storage and lined on the inside with 5/8 in. (16 mm) Type X gypsum wallboard or the approved equivalent. [101:13.4.76.10.3]

13.3.2.9.1
Educational occupancy buildings shall be protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3 except as otherwise permitted by 13.3.2.9.2. [101:14.3.5.1]

13.3.2.10.5
Where another provision of Chapter 15 of NFPA 101 requires an automatic sprinkler system, the sprinkler system shall be installed in accordance with NFPA 1313. [101:15.3.5.5]

13.3.2.11.3
In Type I and Type II construction, alternative protection measures shall be permitted to be substituted for sprinkler protection, without causing a building to be classified as nonsprinklered, in specified areas where the AHJ has prohibited sprinklers. [101:18.3.5.5]

13.3.2.11.5 *
Sprinklers shall not be required in clothes closets of patient sleeping rooms in hospitals where the area of the closet does not exceed 6 ft² (0.55 m²), provided that the distance from the sprinkler in the patient sleeping room to the back wall of the closet does not exceed the maximum distance permitted by NFPA 13. [101:18.3.5.10]

A.13.3.2.11.5
This exception is limited to hospitals, as nursing homes and many limited care facilities might have more combustibles within the closets. The limited amount of clothing found in the small clothes closets in hospital patient rooms is typically far less than the amount of combustibles in casework cabinets that do not require sprinkler protection, such as nurse servers. In many hospitals, especially new hospitals, it is difficult to make a distinction between clothes closets and cabinet work. The exception is far more restrictive than similar exceptions for hotels and apartment buildings. NFPA 13 already permits the omission of sprinklers in wardrobes [see 8.1.1(7) of NFPA 13]. It is not the intent of 13.3.2.11.5 to affect the wardrobe provisions of NFPA 13. It is the intent that the sprinkler protection in the room covers the
13.3.2.12.2
All high-rise buildings containing health care occupancies shall be protected throughout by an approved, supervised automatic sprinkler system installed in accordance with Section 13.3 within 12 years of the adoption of this Code, except as otherwise provided in 13.3.2.12.3 or 13.3.2.12.4. [101:19.4.32.1]

13.3.2.12.3
Where a jurisdiction adopts this edition of the Code and previously adopted the 2015 edition, the sprinklering required by 13.3.2.12.2 shall be installed within 9 years of the adoption of this Code. [101:19.4.32.2]

13.3.2.12.4
Where a jurisdiction adopts this edition of the Code and previously adopted the 2015 edition, the sprinklering required by 13.3.2.12.2 shall be installed within 6 years of the adoption of this Code. [101:19.4.32.3]

13.3.2.12.9 *
Where this Code permits exceptions for fully sprinklered buildings or smoke compartments and specifically references this paragraph, the sprinkler system shall meet all of the following criteria:

(1) It shall be installed throughout the building or smoke compartment in accordance with Section 13.3.
(2) It shall be installed in accordance with NFPA 13, unless it is an approved existing system.
(3) It shall be electrically connected to the fire alarm system.
(4) It shall be fully supervised.
(5) It shall be equipped with listed quick-response or listed residential sprinklers throughout all smoke compartments containing patient sleeping rooms.
(6)* Standard-response sprinklers shall be permitted to be continued to be used in approved existing sprinkler systems where quick-response and residential sprinklers were not listed for use in such locations at the time of installation.
(7) Standard-response sprinklers shall be permitted for use in hazardous areas protected in accordance with 19.3.2.1 of NFPA 101.
[101:19.3.5.8]

A.13.3.2.12.9
The provisions of 13.3.2.12.9(6) and 13.3.2.12.9(7) are not intended to supplant NFPA 13, which requires that residential sprinklers with more than a 10°F (5.6°C) difference in temperature rating not be mixed within a room. Currently there are no additional prohibitions in NFPA 13 on the mixing of sprinklers having different thermal response characteristics. Conversely, there are no design parameters to make practical the mixing of residential and other types of sprinklers. [101:A.19.3.5.8]
Residential sprinklers are considered acceptable in patient sleeping rooms of all health care facilities, even though not specifically listed for this purpose in all cases. [101:A.19.3.5.8]

A.13.3.2.12.9(6)

It is not the intent of the Code to permit standard-response sprinklers to meet the criteria of 13.3.2.12.9 just because the sprinklers were installed before quick-response sprinklers were invented or listed. The intent of 13.3.2.12.9(6) is to permit older quick-response systems to be credited, even though there might be some standard-response sprinklers in existence due to the fact that quick-response sprinklers were unavailable for those specific locations at the time. For example, in the early days of quick-response sprinklers, there were no high-temperature quick-response sprinklers available. [101:A.19.3.5.8(6)]

A.13.3.2.12.11

This exception is limited to hospitals, as nursing homes and many limited care facilities might have more combustibles within the closets. The limited amount of clothing found in the small clothes closets in hospital patient rooms is typically far less than the amount of combustibles in casework cabinets that do not require sprinkler protection, such as nurse servers. In many hospitals, especially new hospitals, it is difficult to make a distinction between clothes closets and cabinet work. The exception is far more restrictive than similar exceptions for hotels and apartment buildings. NFPA 13 already permits the omission of sprinklers in wardrobes [see 8.1.1(7) of NFPA 13]. It is not the intent of 13.3.2.12.11 to affect the wardrobe provisions of NFPA 13. It is the intent that the sprinkler protection in the room covers the closet as if there were no door on the closet. (See 8.5.3.2.3 of NFPA 13.) [101:A.19.3.5.10]

A.13.3.2.14.1

Where the openings in ceilings or partitions are \(\frac{1}{4}\) in. (6.3 mm) or larger in the smallest dimension, where the thickness or depth of the material does not exceed the smallest dimension of the openings, and where such openings constitute not less than 70 percent of the area of the ceiling or partition material, the disruption of sprinkler spray patterns is permitted to be disregarded. [101:A.23.3.5.2]

13.3.2.15.2

Where an automatic sprinkler system is installed, either for total or partial building coverage, the system shall be in accordance with Section 13.3, as modified by 13.3.2.15.3. In hotel or dormitory occupancies up to and including four stories in height, that are located in buildings not exceeding 60 ft (18.3 m) in height above grade plane, systems in accordance with NFPA 13R shall be permitted. [101:28.3.5.3]

13.3.2.15.2.1

Where located in a building of Type III, Type IV, or Type V construction designed in accordance with 4.6.3(5) of NFPA 101, and where the roof assembly is located more than 55 ft (17 m) above the lowest level of required fire department vehicle access, attics shall comply with 13.3.2.15.2.1.1, 13.3.2.15.1.2, and one of the following:

1. Attics shall be provided with sprinkler protection.
2. Attics shall be constructed with noncombustible materials.
3. Attics shall be constructed with fire-retardant-treated wood.
Attics shall be filled with noncombustible insulation. [101:28.3.5.3.1]

**13.3.2.15.4.**
Listed quick-response or listed residential sprinklers shall be used throughout guest rooms and guest room suites. [101:28.3.5.6]

**13.3.2.15.5.4**
Open parking structures that comply with NFPA 88A and are contiguous with hotels or dormitories shall be exempt from the sprinkler requirements of 13.3.2.15.1. [101:28.3.5.67]

**13.3.2.17.1**
All buildings shall be protected throughout by an approved, supervised automatic sprinkler system installed in accordance with 13.3.2.17.2 through 13.3.2.17.6. [101:30.3.5.1]

**13.3.2.17.2.13.3.2.17.1.1**
The height of the roof assembly shall be determined by measuring the distance from the lowest level of required fire department vehicle access adjacent to the building to the eave of the highest pitched roof, the intersection of the highest roof to the exterior wall, or the top of the highest parapet, whichever yields the greatest distance. [101:30.3.5.2.1.1]
13.3.2.17.2.1

Required fire department vehicle access roads used in 13.3.2.17.2.1.1 shall include only those roads that are necessary for required fire department vehicle access in accordance with Section 18.2. [101:30.3.5.2.4.2]

13.3.2.17.3

In buildings sprinklered in accordance with NFPA 13, closets shall meet the following requirements:

1. Closets of less than 12 ft² (1.1 m²) in area in individual dwelling units shall not be required to be sprinklered.
2. Closets that contain equipment such as washers, dryers, furnaces, or water heaters shall be sprinklered, regardless of size.

[101:30.3.5.3]

A.13.3.2.17.3

The 12 ft² (1.1 m²) closet sprinkler exemption differs from requirements in NFPA 13 because fire loss data supports the long-standing position of NFPA 101, since the 1976 edition of NFPA 101, to omit sprinklers from such closets. The provision is further supported by the lack of losses in buildings protected in accordance with NFPA 13D and NFPA 13R which permit the omission of sprinklers from closets not exceeding 24 ft² (2.2 m²). [101:A.30.3.5.3]

13.3.2.17.4

In buildings sprinklered in accordance with NFPA 13 bathrooms not greater than 55 ft² (5.1 m²) in individual dwelling units shall not be required to be sprinklered. [101:30.3.5.4]

13.3.2.17.45 Convenience Openings.

The draft stop and closely spaced sprinkler requirements of NFPA 13 shall not be required for convenience openings complying with 8.6.9.1 of NFPA 101 where the convenience opening is within the dwelling unit. [101:30.3.5.45]

13.3.2.17.6

Listed quick-response or listed residential sprinklers shall be used throughout all dwelling units. [101:30.3.5.6]

13.3.2.17.57 Open Parking Structures.

Open parking structures complying with NFPA 88A that are contiguous with apartment buildings shall be exempt from the sprinkler requirements of 13.3.2.17.1. [101:30.3.5.57]

13.3.2.17.68 Unprotected Openings.

Buildings with unprotected openings in accordance with 8.6.6 of NFPA 101 shall be protected throughout by an approved, supervised automatic sprinkler system in accordance with 13.3.2.17.1. [101:30.3.5.8]
13.3.2.18.1 *
Where an automatic sprinkler system is installed, either for total or partial building coverage, the system shall be installed in accordance with Section 13.3, as modified by 13.3.2.18.2 and 13.3.2.18.34. In buildings four or fewer stories in height and not exceeding 60 ft (18.3 m) in height above grade plane, systems in accordance with NFPA 13R shall be permitted. [101:31.3.5.2]

A.13.3.2.18.3
The provision of 13.3.2.18.3 differs from NFPA 13 because fire data shows that in apartment fires where sprinklers were present, bathrooms were the area of origin in 1 percent of the total fires, and resulted in no civilian deaths, civilian injuries, or property loss. NFPA 101 and NFPA 13 both allow sprinklers to be omitted in small bathrooms in dwelling units. Historically, NFPA 13 sometimes differed in this requirement. Maintaining this provision in NFPA 101 allows all previously approved sprinkler installations to remain compliant. [101:A.31.3.5.4]

13.3.2.18.5
Buildings using Option 3 in accordance with NFPA 101 shall be provided with automatic sprinkler protection installed in accordance with 13.3.2.18.5.1 through 13.3.2.18.5.4. [101:31.3.5.69]

13.3.2.18.5.1
Automatic sprinklers shall be installed in the corridor, along the corridor ceiling, utilizing the maximum spacing requirements of the standards referenced in by 13.3.1.2. [101:31.3.5.69.1]

13.3.2.18.5.2
An automatic sprinkler shall be installed within every dwelling unit that has a door opening to the corridor, with such sprinkler positioned over the center of the door, unless the door to the dwelling unit has not less than a 20-minute fire protection rating and is self-closing. [101:31.3.5.69.2]

13.3.2.18.5.3
The workmanship and materials of the sprinkler installation specified in 13.3.2.18.5 shall meet the requirements of 13.3.1.2. [101:31.3.5.69.3]

13.3.2.18.5.4
Where Option 3 is being used to permit the use of 1 3/4 in. (44 mm) thick, solid-bonded wood-core doors in accordance with 31.2.2.1.3 of NFPA 101, sprinklers shall be provided within the exit enclosures in accordance with NFPA 13. [101:31.3.5.69.4]

13.3.2.18.6
Buildings using Option 4 in accordance with NFPA 101 shall be protected throughout by an approved automatic sprinkler system in accordance with 13.3.2.18.1 and meeting the requirements of Section 13.3 for supervision for buildings seven or more stories in height. [101:31.3.5.710]
13.3.2.18.7 *
Where sprinklers are being used as an option to any requirement in this Code, the sprinklers shall be installed throughout the space in accordance with the requirements of that option. [101:31.3.5.811]

A.13.3.2.18.7
For example, if an Option 3 sprinkler system were being used to justify use of Class C wall finish in an exit enclosure, the sprinkler system would need to be extended into the exit enclosure, even if the rest of the requirements for Option 3 did not require the sprinklers in the exit enclosure. [101:A.31.3.5.811]

13.3.2.19.2.4
In buildings sprinklered in accordance with NFPA 13, closets less than 12 ft² (1.1 m²) in area in individual dwelling units shall not be required to be sprinklered. [101:26.3.6.2.4]

13.3.2.19.2.5
In buildings sprinklered in accordance with NFPA 13, closets that contain equipment such as washers, dryers, furnaces, or water heaters shall be sprinklered, regardless of size. [101:26.3.6.2.5]

13.3.2.21.2.7.1
Where an automatic sprinkler system is required by 13.3.2.21.2, attics used for living purposes, storage, or fuel-fueled equipment shall be protected with automatic sprinklers that are part of the required, approved automatic sprinkler system in accordance with 13.3.1.2. [101:32.3.5.7.1]

13.3.2.22.1.4.1
Where an automatic sprinkler system is installed, attics used for living purposes, storage, or fuel-fired equipment shall be protected with automatic sprinklers that are part of the required, approved automatic sprinkler system in accordance with 13.3.1.2. [101:33.3.5.4.1]

13.3.2.22.1.4.2
Where an automatic sprinkler system is installed, attics not used for living purposes, storage, or fuel-fired equipment shall meet one of the following criteria:

1. Attics shall be protected throughout by a heat detection system arranged to activate the building fire alarm system in accordance with Section 13.7.
2. Attics shall be protected with automatic sprinklers that are part of the required, approved automatic sprinkler system in accordance with 13.3.1.2.
3. Attics shall be of noncombustible or limited-combustible construction.
4. Attics shall be constructed of fire-retardant-treated wood in accordance with NFPA 703.

[101:33.3.5.4.2]

13.3.2.22.4.2
Where an automatic sprinkler system is installed, attics not used for living purposes, storage, or fuel-fired equipment shall meet one of the following criteria:
Attics shall be protected throughout by a heat detection system arranged to activate the building fire alarm system in accordance with Section 13.7.

Attics shall be protected with automatic sprinklers that are part of the required, approved automatic sprinkler system in accordance with 13.3.1.2.

Attics shall be of noncombustible or limited-combustible construction.

Attics shall be constructed of fire-retardant-treated wood in accordance with NFPA 703.

Attics shall be protected by heat alarms arranged to provide occupant notification in accordance with 13.7.2.21.2 13.7.2.21.3 33.2.3.4.2.

[101:33.2.3.5.7.2]

**13.3.2.23.1**

Mercantile occupancies shall be protected by an approved automatic sprinkler system in accordance with NFPA 13 in any of the following specified locations:

1. Throughout all mercantile occupancies three or more stories in height
2. Throughout all mercantile occupancies exceeding 12,000 ft² (1115 m²) in gross area
3. Throughout stories below the level of exit discharge where such stories have an area exceeding 2500 ft² (232 m²) and are used for the sale, storage, or handling of combustible goods and merchandise
4. Throughout multiple occupancies protected as mixed occupancies in accordance with 6.1.14 where the conditions of 13.3.2.23.1(1), 13.3.2.23.1 (2), or 13.3.2.23.1 (3) apply to the mercantile occupancy

[101:36.3.5.1]

**13.3.2.23.2**

Automatic sprinkler systems in Class A mercantile occupancies shall be supervised in accordance with 13.3.1.8. [101:36.3.5.2]

**13.3.2.23.3 Extinguishing Requirements.**

Bulk merchandising retail buildings shall be protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3 and the applicable provisions of the following:

1. This Code
2. NFPA 13, *Standard for the Installation of Sprinkler Systems*
3. NFPA 30, *Flammable and Combustible Liquids Code*
4. NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products*

[101:36.4.5.5]

**13.3.2.24.1**

Mercantile occupancies, other than one-story buildings that meet the requirements of a street floor, as defined in 3.3.196.19, shall be protected by an approved automatic sprinkler system in accordance with NFPA 13 in any of the following specified locations:
Throughout all mercantile occupancies with a story over 15,000 ft$^2$ (1400 m$^2$) in area
Throughout all mercantile occupancies exceeding 30,000 ft$^2$ (2800 m$^2$) in gross area
Throughout stories below the level of exit discharge where such stories have an area exceeding 2500 ft$^2$ (232 m$^2$) and are used for the sale, storage, or handling of combustible goods and merchandise
Throughout multiple occupancies protected as mixed occupancies in accordance with 6.1.14 where the conditions of 13.3.2.24.1(1), 13.3.2.24.1(2), or 13.3.2.24.1(3) apply to the mercantile occupancy

13.3.2.25 Underground and Limited Access Structures.

Underground and limited-access structures, and all areas and floor levels traversed in traveling to the exit discharge, shall be protected by an approved, supervised automatic sprinkler system in accordance with Section 13.3, unless such structures meet one of the following criteria:

1. They have an occupant load of 50 or fewer persons in new underground or limited-access portions of the structure.
2. They have an occupant load of 100 or fewer persons in existing underground or limited-access portions of the structure.
3. The structure is a one-story underground or limited-access structure that is permitted to have a single exit, per Chapters 12 through 43 of NFPA 101, with a common path of travel not greater than 50 ft (15 m).

13.7.1.4.2 *

To ensure operational integrity, the fire alarm system shall have an approved maintenance and testing program complying with the applicable requirements of NFPA 70 and NFPA 72. [101:9.6.1.54]

A.13.7.1.4.2

Records of conducted maintenance and testing and a copy of the certificate of compliance should be maintained. [101:A.9.6.1.54]

13.7.1.4.3

Fire alarm system impairment procedures shall comply with NFPA 72. [101:9.6.1.65]

13.7.1.7.1

Where required by other sections of this Code, actuation of the fire alarm system shall occur by any or all of the following means of initiation, but shall not be limited to such means:

1. Manual fire alarm initiation
2. Automatic detection
3. Extinguishing system operation

[101:9.6.2.1]
13.7.1.8.1
Where required by another section of this Code, single-station and multiple-station smoke alarms shall be in accordance with NFPA 72 unless otherwise provided in 13.7.1.8.3, 13.7.1.8.4, 13.7.1.8.4.4, 13.7.1.8.7, or 13.7.1.8.5. [101:9.6.2.10.1]

13.7.1.8.3 Smoke Alarms in Sleeping Rooms.

13.7.1.8.3.1
In new construction, where required by Chapters 11 through 43, the alarm notification signal in sleeping rooms resulting from activation of smoke alarms shall be a 520 Hz low-frequency signal complying with NFPA 72. [101:9.6.2.10.3.1]

13.7.1.8.4
The interconnection of smoke alarms shall apply only to new construction as provided in 13.7.1.8.3. [101:9.6.2.10.4]

A.13.7.1.8.4A.13.7.1.8.4
NFPA 72 mandates smoke alarms in all sleeping rooms, and interconnection of smoke alarms is required for both new and existing installations. Per 13.7.1.8.1, the residential occupancy requirements determine whether smoke alarms are needed within sleeping rooms. Paragraph 13.7.1.8.3 limits the requirement for interconnection of smoke alarms to those in new construction. This Code does not intend to require compliant, existing smoke alarm installations to be interconnected. This Code is periodically revised to add retrospective requirements only where the need is clearly substantiated. [101:A.9.6.2.10.43]

Renumber Existing 13.7.1.8.4 Specific Location Requirements to 13.7.1.8.5 Specific Location Requirements (including all subsections and associated Annex)

13.7.1.8.5
System smoke detectors in accordance with NFPA 72 and arranged to function in the same manner as single-station or multiple-station smoke alarms shall be permitted in lieu of smoke alarms. [101:9.6.2.10.8]

13.7.1.8.6
Smoke alarms, other than battery-operated smoke alarms as permitted by other sections of this Code, shall be powered in accordance with the requirements of NFPA 72. [101:9.6.2.10.98]

In new construction, where two or more smoke alarms are required within a dwelling unit, suite of rooms, or similar area, they shall be arranged so that operation of any smoke alarm shall cause the
alarm in all smoke alarms within the dwelling unit, suite of rooms, or similar area to sound, unless otherwise permitted by one of the following:

1. The requirement of 13.7.1.8.7.13.7.1.8.8 shall not apply where permitted by another section of this Code.

2. The requirement of 13.7.1.8.7.13.7.1.8.8 shall not apply to configurations that provide equivalent distribution of the alarm signal.

A.13.7.1.8.7A.13.7.1.8.8
A dwelling unit is that structure, area, room, or combination of rooms, including hotel rooms/suites, in which a family or individual lives. A dwelling unit includes living areas only and not common usage areas in multifamily buildings, such as corridors, lobbies, and basements. [101:A.9.6.2.10.108]

13.7.1.8.913.7.1.8.9
The alarms described in 13.7.1.8.713.7.1.8.8 shall sound only within an individual dwelling unit, suite of rooms, or similar area and shall not actuate the building fire alarm system, unless otherwise permitted by the AHJ. [101:9.6.2.10.110]

13.7.1.8.913.7.1.8.10
Smoke alarms shall be permitted to be connected to the building fire alarm system for the purpose of annunciation in accordance with NFPA 72. [101:9.6.2.10.124]

13.7.1.9.3
Where required by Chapters 11 through 43, the audible alarm notification signal provided in sleeping rooms resulting from the activation of the fire alarm system or sleeping room smoke detector shall be a 520 Hz low-frequency signal complying with NFPA 72. [101:9.6.3.3]

13.7.1.9.313.7.1.9.4
Where permitted by Chapters 11 through 43 of NFPA 101, a presignal system shall be permitted where the initial fire alarm signal is automatically transmitted without delay to a municipal fire department, to a fire brigade (if provided), and to an on-site staff person trained to respond to a fire emergency. [101:9.6.3.39.6.3.4]

13.7.1.9.513.7.1.9.4
Where permitted by Chapters 11 through 43 of NFPA 101, a positive alarm sequence shall be permitted, provided that it is in accordance with NFPA 72. [101:9.6.3.45]

13.7.1.9.613.7.1.9.5
Unless otherwise provided in 13.7.1.9.5.13.7.1.9.6.1 through 13.7.1.9.5.813.7.1.9.6.8, notification signals for occupants to evacuate shall be by audible and visible signals in accordance with NFPA 72 and ICC/ANSI A117.1, American National Standard for Accessible and Usable Buildings and Facilities, or other means of notification acceptable to the AHJ. [101:9.6.3.68]
Areas not subject to occupancy by persons who are hearing impaired shall not be required to comply with the provisions for visible signals. \([101]:9.6.3.65.1\)

Visible-only signals shall be provided where specifically permitted in health care occupancies in accordance with Chapters 18 and 19 of NFPA 101. \([101]:9.6.3.65.2\)

Existing alarm systems shall not be required to comply with the provision for visible signals. \([101]:9.6.3.65.3\)

Visible signals shall not be required in lodging or rooming houses in accordance with Chapter 26 of NFPA 101. \([101]:9.6.3.65.4\)

Visible signals shall not be required in exit stair enclosures. \([101]:9.6.3.65.5\)

Visible signals shall not be required in elevator cars. \([101]:9.6.3.65.6\)

Public mode visual notification appliances in accordance with NFPA 72 shall not be required in designated areas as permitted by Chapters 11 through 43 of NFPA 101, provided that they are replaced with approved alternative visible means. \([101]:9.6.3.65.7\)

Visual notification appliances installed in large-volume spaces, such as arenas, stadiums, mall concourses, and atriums, can be alternative devices which are not listed as visible notification appliances for fire alarm systems provided that the notification objective of the visual signal is reasonably achieved. Examples of alternative devices include, but are not limited to, scoreboards, message boards, and other electronic devices that meet the performance objectives of visible fire alarm appliances in large-volume spaces. \([101]:A.9.6.3.65.7\)

It is the intent to permit the omission of visible notification appliances as identified in 13.7.1.9.6.713.7.1.9.6.7 provided that the adjacent areas that have not been specifically designated as exempt are provided with visible notification as required by 13.7.1.9.6.613.7.1.9.6.6. \([101]:A.9.6.3.65.7\)

Where visible signals are not required, as permitted by 13.7.1.9.6.13.7.1.9.6.813.7.1.9.6.8, documentation of such omission shall be maintained in accordance with 9.7.79.13.3 of NFPA 101. \([101]:9.6.3.65.8\)
A.13.7.1.9.6.8A.13.7.1.9.5.8
Documentation should be maintained with the as-built drawings so that inspection and testing personnel understand that the visible appliances have been exempted from certain areas and, therefore, can note the deviation on the acceptance test documentation and ongoing inspection reports. This will provide inspection and testing personnel with necessary details regarding the omission of visible notification appliances. [101:A.9.6.3.65.8]

13.7.1.9.613.7.1.9.7
The general evacuation alarm signal shall operate in accordance with one of the methods prescribed by 13.7.1.9.6.1 through 13.7.1.9.6.3. [101:9.6.3.76]

13.7.1.9.7.113.7.1.9.6.1
The general evacuation alarm signal shall operate throughout the entire building other than the locations described in 13.7.1.9.7.4 and 13.7.1.9.7.5. [101:9.6.3.76.1]

13.7.1.9.7.213.7.1.9.6.2*
Where total evacuation of occupants is impractical due to building configuration, only the occupants in the affected zones shall be initially notified, and provisions shall be made to selectively notify occupants in other zones to afford orderly evacuation of the entire building, provided that such arrangement is approved by the AHJ. [101:9.6.3.76.2]

A.13.7.1.9.7.2A.13.7.1.9.6.2
To approve an evacuation plan to selectively notify building occupants, the AHJ should consider several building parameters, including building compartmentation, detection and suppression system zones, occupant loads, and the number and arrangement of the means of egress. [101:A.9.6.3.7.2]

In high-rise buildings, it is typical to evacuate the fire floor, the floor(s) above, and the floor immediately below. Other areas are then evacuated as the fire develops. [101:A.9.6.3.76.2]

13.7.1.9.7.313.7.1.9.6.3
Where occupants are incapable of evacuating themselves because of age, physical or mental disabilities, or physical restraint, all of the following shall apply:

1. The private operating mode as described in NFPA 72 shall be permitted to be used.
2. Only the attendants and other personnel required to evacuate occupants from a zone, area, floor, or building shall be required to be notified.
3. Notification of personnel as specified in 13.7.1.9.7.3(2) shall include means to readily identify the zone, area, floor, or building in need of evacuation. [101:9.6.3.76.3]

13.7.1.9.7.413.7.1.9.6.4
The general evacuation signal shall not be required in exit stair enclosures. [101:9.6.3.76.4]
13.7.1.9.7.5
The general evacuation signal shall not be required in elevator cars. [101:9.6.3.76.5]

13.7.1.9.813.7.1.9.7
Audible alarm notification appliances shall be of such character and so distributed as to be effectively heard above the average ambient sound level that exists under normal conditions of occupancy. [101:9.6.3.87]

13.7.1.9.9
Audible alarm notification appliances shall produce signals that are distinctive from audible signals used for other purposes in a given building. [101:9.6.3.98]

13.7.1.9.10
Automatically transmitted or live voice evacuation or relocation instructions shall be permitted to be used to notify occupants and shall comply with either 13.7.1.9.10.1 or 13.7.1.9.10.2. [101:9.6.3.109]

13.7.1.9.10.1
Automatically transmitted or live voice evacuation or relocation instructions shall be in accordance with NFPA 72. [101:9.6.3.109.1]

13.7.1.9.10.2
Where permitted by Chapters 11 through 43 of NFPA 101, automatically transmitted or live voice announcements shall be permitted to be made via a voice communication or public address system that complies with all of the following:

1. Occupant notification, either live or recorded, shall be initiated at a constantly attended receiving station by personnel trained to respond to an emergency.
2. An approved secondary power supply shall be provided for other than existing, previously approved systems.
3. The system shall be audible above the expected ambient noise level.
4. Emergency announcements shall take precedence over any other use.

[101:9.6.3.109.2]

13.7.1.9.11
Unless otherwise permitted by another section of this Code, audible and visible fire alarm notification appliances shall comply with either 13.7.1.9.11.1 or 13.7.1.9.11.2. [101:9.6.3.110]

13.7.1.9.11.1
Audible and visible fire alarm notification appliances shall be used only for fire alarm system or other emergency purposes. [101:9.6.3.110.1]
13.7.1.9.11.2 Emergency voice/alarm communication systems shall be permitted to be used for other purposes in accordance with NFPA 72. [101:9.6.3.110.2]

13.7.1.12.113.7.1.11.1 Fire Safety Emergency Control Functions.

13.7.1.12.113.7.1.11 Emergency control functions shall be installed in accordance with the requirements of NFPA 72. [101:9.6.65.1]

13.7.1.12.213.7.1.11.2 Where required by another section of this Code, the following functions shall be actuated:

1. Release of hold-open devices for doors or other opening protectives
2. Stairwell or elevator shaft pressurization
3. Smoke management or smoke control systems
4. Unlocking of doors
5. Elevator recall and shutdown
6. HVAC shutdown

[101:9.6.65.2]

13.7.1.13.113.7.1.12 Location of Controls.
Operator controls, alarm indicators, and manual communications capability shall be installed at a convenient location acceptable to the AHJ. [101:9.6.76]


13.7.1.14.113.7.1.13.1 Where alarm annunciation is required by another section of this Code, it shall comply with 13.7.1.14.213.7.1.13.2 through 13.7.1.14.1313.7.1.13.13. [101:9.6.78.1]

13.7.1.14.713.7.1.13.7 Alarm annunciation at the control center shall be by means of audible and visible indicators.

[101:9.6.87.2]

13.7.1.14.813.7.1.13.8 For the purposes of alarm annunciation, each floor of the building, other than floors of existing buildings, shall be considered as not less than one zone, unless otherwise permitted by 13.7.1.14.9.413.7.1.13.9.4, 13.7.1.14.313.7.1.13.9.5, 13.7.1.14.9.613.7.1.13.9.6, or as another section of this Code. [101:9.6.87.3]

13.7.1.14.913.7.1.13.9 Where a floor area exceeds 22,500 ft² (2090 m²), additional fire alarm zoning shall be provided, and the
length of any single fire alarm zone shall not exceed 300 ft (91 m) in any direction, except as provided in Section 13.7.1.14.9.113.7.1.13.9.1 through 13.7.1.14.9.613.7.1.13.9.6 or otherwise modified by another section of this Code. [101:9.6.87.4]

**13.7.1.14.9.1 13.7.1.13.9.1**

Where permitted by another section of this Code, fire alarm zones shall be permitted to exceed 22,500 ft² (2090 m²), and the length of a zone shall be permitted to exceed 300 ft (91 m) in any direction. [101:9.6.87.4.1]

**13.7.1.14.9.213.7.1.13.9.2**

Where the building is protected by an automatic sprinkler system in accordance with NFPA 13, the area of the fire alarm zone shall be permitted to coincide with the allowable area of the sprinkler system. [101:9.6.87.4.2]

**13.7.1.14.9.313.7.1.13.9.3**

Where the building is protected by a water mist system in accordance with NFPA 101, the area of the fire alarm zone shall be permitted to coincide with the allowable area of the water mist system. [101:9.6.87.4.3]

**13.7.1.14.9.413.7.1.13.9.4**

Unless otherwise prohibited by another section of this Code, where a building not exceeding four stories in height is protected by an automatic water mist system in accordance with 9.8.17.3 of NFPA 101, the water mist system shall be permitted to be annunciated on the fire alarm system as a single zone. [101:9.6.87.4.4]

**13.7.1.14.9.513.7.1.13.9.5**

Unless otherwise prohibited by another section of this Code, where a building not exceeding four stories in height is protected by an automatic sprinkler system in accordance with NFPA 13, the sprinkler system shall be permitted to be annunciated on the fire alarm system as a single zone. [101:9.6.87.4.5]

**13.7.1.14.9.613.7.1.13.9.6**

Where the building is protected by an automatic sprinkler system in accordance with NFPA 13D or NFPA 13R, the sprinkler system shall be permitted to be annunciated on the fire alarm system as a single zone. [101:9.6.87.4.6]

**13.7.1.14.1013.7.1.13.10**

A system trouble signal shall be annunciated by means of audible and visible indicators, in accordance with NFPA 72. [101:9.6.87.5]

**13.7.1.14.1113.7.1.13.11**

A system supervisory signal shall be annunciated by means of audible and visible indicators in accordance with NFPA 72. [101:9.6.87.6]
13.7.1.14 Where the system serves more than one building, each building shall be annunciated separately. [101:9.6.87.7]

13.7.1.14.13 Where permitted by another section of this Code, the alarm zone shall be permitted to coincide with the permitted area for smoke compartments. [101:9.6.87.8]

13.7.1.15 Carbon Monoxide (CO) Detection and Warning Equipment.
Where required by another section of this Code, carbon monoxide (CO) detection and warning equipment shall be provided in accordance with NFPA 720. [101:9.12]

13.7.1.16 Risk Analysis for Mass Notification Systems.

A.13.7.1.16A This section does not require mass notification systems, it only provides direction for the risk analysis. Where the risk analysis and resulting action plan identifies a need for a mass notification system, NFPA 72 should be used for design and installation requirements. [101:A.9.14]

13.7.1.16.1 Where Required.

13.7.1.15.1.1 Where required by another section of this Code, a risk analysis for mass notification systems shall be provided in accordance with the requirements of Chapter 24 of NFPA 72 and the provisions of 13.7.1.15.2 through 13.7.1.15.4. [101:9.14.1.1]

A.13.7.1.16 A risk analysis will determine whether a mass notification system is required in addition to the life safety emergency communication systems required by this Code. The risk analysis might show that no additional notification is required. [101:A.9.14.1]

13.7.1.16.2 Where a mass notification system is required by the risk analysis in 13.7.1.15.1.1, the system shall be in accordance with the requirements of Chapter 24 of NFPA 72. [101:9.14.1.2]

13.7.1.15.2 Purpose.

13.7.1.15.2.1 The purpose of the mass notification system shall be to communicate information about emergencies including, but not limited to, fire, human-caused events (accidental and intentional), other dangerous situations, accidents, and natural disasters. [101:9.14.2.1]
13.7.1.15.2.2
The purpose of the emergency action plan for the mass notification system shall be to identify the mass notification system design and performance requirements in accordance with the results of the risk analysis. [101:9.14.2.2]

13.7.1.15.3 Documentation.
13.7.1.15.3.1
The emergency action plan, risk assessment report, and accompanying documentation shall be submitted to the authority having jurisdiction by the registered design professional (RDP). The format and content of the documentation shall be acceptable to the authority having jurisdiction. [101:9.14.3.1]

13.7.1.15.3.2 *
Where required by the authority having jurisdiction, an independent review of the emergency action plan, risk assessment, and the accompanying documentation by one or more individuals possessing expertise in risk characterization for accidental and intentional hazards shall be performed. [101:9.14.3.2]

A.13.7.1.15.3.2
These peer reviews should focus on the assumptions and methods of analysis used and on the findings. Peer reviewers should submit written assessment reports to the authority having jurisdiction. [101:A.9.14.3.2]

13.7.1.15.4 Emergency Action Plan.
The completed emergency action plan in accordance with Section 4.8 of NFPA 101 shall be used for the design of the mass notification/emergency communications system. [101:9.14.4]

13.7.2.1.3.1
Positive alarm sequence in accordance with 13.7.1.9.4 13.7.1.9.5 shall be permitted. [101:12.3.4.3.1]

13.7.2.1.3.3
Occupant notification shall be by means of voice announcements in accordance with 13.7.1.9.9 13.7.1.9.10, initiated by the person in the constantly attended receiving station. [101:12.3.4.3.3]

13.7.2.1.3.4
Occupant notification shall be by means of visible signals in accordance with 13.7.1.9.5 13.7.1.9.6, initiated by the person in the constantly attended receiving station, unless otherwise permitted by 13.7.2.1.3.5. [101:12.3.4.3.4]

13.7.2.1.3.5 *
Visible signals shall not be required in the assembly seating area, or the floor area used for the contest,
performance, or entertainment, where the occupant load exceeds 1000 and an approved, alternative visible means of occupant notification is provided. (See 13.7.1.9.5.713.7.1.9.6.7.) [101:12.3.4.3.5]

13.7.2.1.3.6
The announcement shall be permitted to be made via a voice communication or public address system in accordance with 13.7.1.9.9.213.7.1.9.10.2. [101:12.3.4.3.6]

13.7.2.1.4.1
New assembly occupancies shall be provided with carbon monoxide detection and warning equipment in accordance with 43.7.1.1413.7.1.15 in the locations specified as follows:

(1) On the ceilings of rooms containing permanently in-stalled fuel-burning appliances or fuel-burning fireplaces
(2) Centrally located within occupiable spaces served by the first supply air register from permanently installed fuel-burning HVAC systems
(3)* Centrally located within occupiable spaces adjacent to an attached garage

[101:12.3.4.4.1]

A.13.7.2.1.4.1(3)
The intent is to require CO detectors in occupiable spaces immediately adjacent, vertically or horizontally, to attached garages, regardless of the presence of openings between the garage and the adjacent occupiable spaces. Other occupiable spaces that are not adjacent to the attached garage do not require CO detectors. [101:A.12.3.4.4.1(3)]

13.7.2.1.4.2
Carbon monoxide detectors as specified in 13.7.2.1.4.1 shall not be required in the following locations:

(1) Garages
(2) Occupiable spaces with attached garages that are open parking structures as defined in 3.3.196.26.33.3.199.26.3.
(3) Occupiable spaces with attached garages that are mechanically ventilated in accordance with the mechanical code

[101:12.3.4.4.2]

13.7.2.1.5 Risk Analysis for Mass Notification Systems.
A risk analysis in accordance with 13.7.1.1513.7.1.16 shall be performed for new assembly occupancies with an occupant load of 500 or more to determine if a mass notification system is required. [101:12.3.4.5]

13.7.2.2.3.1
Positive alarm sequence in accordance with 13.7.1.9.413.7.1.9.5 shall be permitted. [101:13.3.4.3.1]
13.7.2.2.3.2
A presignal system in accordance with 13.7.1.9.313.7.1.9.4 shall be permitted. [101:13.3.4.3.2]

13.7.2.2.3.3
Occupant notification shall be by means of voice announcements in accordance with 13.7.1.9.913.7.1.9.10 initiated by the person in the constantly attended receiving station. [101:13.3.4.3.3]

13.7.2.2.3.6
The announcement shall be permitted to be made via a voice communication or public address system in accordance with 13.7.1.9.213.7.1.9.10.2. [101:13.3.4.3.6]

13.7.2.3.3.1.3
Positive alarm sequence shall be permitted in accordance with 13.7.1.9.5. [101:14.3.4.3.1.3]

13.7.2.3.3.1.4
In accordance with 13.7.1.9.11.2, the emergency voice/alarm communication system shall be permitted to be used for other emergency signaling or for class changes. [101:14.3.4.3.1.4]

13.7.2.3.4.1
Carbon monoxide detectors in accordance with 13.7.1.1413.7.1.15 shall be provided in new educational occupancies in the locations specified as follows:

1. Carbon monoxide detectors shall be installed on the ceilings of rooms containing permanently installed fuel-burning appliances.
2. Carbon monoxide detectors shall be installed centrally located within occupiable spaces served by the first supply air register from a permanently installed, fuel-burning HVAC system.
3. Carbon monoxide detectors shall be installed centrally located within occupiable spaces adjacent to a communicating attached garage.
4. Carbon monoxide detectors shall be installed centrally located within occupiable spaces adjacent to an attached garage with a separation wall constructed of gypsum wallboard. [101:14.3.4.4.1]

13.7.2.3.4.2
Carbon monoxide alarms and carbon monoxide detectors as specified in 13.7.2.3.4.1 shall not be required in the following locations:

1. Garages
2. Occupiable spaces with communicating attached garages that are open parking structures as defined in 3.3.196.26.33.3.199.26.3
3. Occupiable spaces with communicating attached garages that are mechanically ventilated in accordance with the applicable mechanical code
4. Occupiable spaces that are separated from attached garages by walls constructed of gypsum wallboard where the garage is an open parking structure as defined in 3.3.196.26.33.3.199.26.3
Occupiable spaces that are separated from attached garages by walls constructed of gypsum wallboard where the garage is mechanically ventilated in accordance with the mechanical code.

13.7.2.3.5 Risk Analysis for Mass Notification Systems.
A risk analysis in accordance with 13.7.1.16 shall be performed to determine if a mass notification system is required.

13.7.2.4.3.1.3
Positive alarm sequence shall be permitted in accordance with 13.7.1.9.5.

13.7.2.5.3.2
Positive alarm sequence shall be permitted in accordance with 13.7.1.9.5.

13.7.2.5.3.3
Private operating mode in accordance with 13.7.1.9.6.

13.7.2.5.6.2
Where a day-care home is located within a building of another occupancy, such as in an apartment building or office building, any corridors serving the day-care home shall be provided with a smoke detection system in accordance with 13.7.1.4 except as otherwise provided in 13.7.2.5.6.3.

13.7.2.5.6.3
The corridor smoke detection system addressed in 13.7.2.5.6.2 shall not be required where all of the following conditions are met:

1. The day-care home is in a building of another occupancy that is not required to have a fire alarm system by some other provision of this Code.
2. Smoke alarms are installed in accordance with 13.7.1.8 in the corridor serving the day-care home.
3. Smoke alarms are installed within the day-care home as required by 13.7.2.5.6.1.
4. Additional smoke alarms are installed within the day-care home within 15 ft (4.6 m) of all sleeping rooms.
5. The smoke alarms required by 13.7.2.5.6.3(2), (3), and (4) are interconnected, as required by NFPA 72, so that each sounds an alarm when any of these smoke alarms detects smoke.

13.7.2.5.6.4
Single-station or multiple-station smoke alarms or smoke detectors shall be provided in all rooms used for sleeping in accordance with 13.7.1.8.
Single-station or multiple-station carbon monoxide alarms or detectors shall be provided in accordance with 13.7.1.14 in day-care homes where client sleeping occurs and one or both of the following conditions exist:

1. Fuel-fired equipment is present.
2. An enclosed parking structure is attached to the day-care home.

13.7.2.6.3.2
Positive alarm sequence shall be permitted in accordance with 13.7.1.9.4. [101:17.3.4.3.2]

13.7.2.6.3.3
Private operating mode in accordance with 13.7.1.9.6.3 shall be permitted. [101:17.3.4.3.3]

13.7.2.6.6.2
Where a day-care home is located within a building of another occupancy, such as in an apartment building or office building, any corridors serving the day-care home shall be provided with a smoke detection system in accordance with 13.7.1.7 except as otherwise provided in 13.7.2.6.6.3. [101:17.6.3.4.2]

13.7.2.6.6.3
The corridor smoke detection system addressed in 13.7.2.6.6.2 shall not be required where all of the following conditions are met:

1. The day-care home is in a building of another occupancy that is not required to have a fire alarm system by another provision of this Code.
2. Smoke alarms are installed in accordance with 13.7.1.8 in the corridor serving the day-care home.
3. Smoke alarms are installed within the day-care home as required by 13.7.2.6.6.1.
4. Additional smoke alarms are installed within the day-care home within 15 ft (4.6 m) of all sleeping rooms.
5. The smoke alarms required by 13.7.2.6.6.3(2), (3), and (4) are interconnected, as required by NFPA 72, so that each sounds an alarm when any of these smoke alarms detects smoke.
6. The exemption of 13.7.2.6.6.5 for existing battery-powered smoke alarms does not apply. [101:17.6.3.4.3]

13.7.2.6.6.4
Single-station or multiple-station smoke alarms or smoke detectors shall be provided in all rooms used for sleeping in accordance with 13.7.1.8, other than as permitted by 13.7.2.6.6.4. [101:17.6.3.4.4]

13.7.2.6.6.5
Approved existing battery-powered smoke alarms, rather than house electrical service–powered smoke alarms required by 13.7.2.6.6.3, shall be permitted where the facility has testing, maintenance, and battery replacement programs that ensure reliability of power to the smoke alarms. [101:17.6.3.4.5]
13.7.2.7.3 Notification.

Positive alarm sequence in accordance with 13.7.1.9.4 \[101:18.3.4.3\] shall be permitted.

13.7.2.7.3.1 Occupant Notification.

Occupant notification shall be accomplished automatically in accordance with 13.7.1.9, unless otherwise modified by the following:

1. Paragraph 13.7.1.9.2.3 shall not be permitted to be used.

2. Where the private operating mode in accordance with NFPA \[378\] 72 is used, alarm notification appliances shall not be required in patient care spaces where alarm notification adversely affects patient care. In lieu of audible alarm signals, visible alarm-indicating appliances shall be permitted to be used in critical care areas.

3. The provision of 18.3.2.5.3(13)(c) of NFPA \[101\] 101 shall be permitted to be used.

A.13.7.2.7.3.1(2)

In health care occupancies, fire alarm system notification is often designed primarily to notify staff who are responsible for the occupants in their care. The staff can be used as an alternate means for notifying others who might need to relocate or evacuate. It is the intent of this provision to permit a visible fire alarm signal instead of an audible signal to reduce interference between the fire alarm and medical equipment monitoring alarms. \[101:A.18.3.4.3.1(2)\]

13.7.2.7.3.3 Annunciation and annunciation zoning shall be provided in accordance with 13.7.1.13 \[101:18.3.4.3.1\] unless otherwise permitted by 13.7.2.7.3.2 or 13.7.2.7.3.3. \[101:18.3.4.3.1\]

13.7.2.7.3.3.3 The provision of 13.7.1.13.9.2 \[101:18.3.4.3.3\], which permits sprinkler system workflow to be annunciated as a single building zone, shall be prohibited.

13.7.2.7.4 Emergency Control Functions.

Operation of any activating device in the required fire alarm system shall be arranged to accomplish automatically any control functions to be performed by that device. \(See\ 13.7.1.11\) \[101:18.3.4.4\]

A.13.7.2.7.5.3

The requirement for smoke detectors in spaces open to the corridors eliminates the requirements of 18.3.6.1-(1)(c), \[101:18.3.4.5\] 18.3.6.1(2)(b), and \[101:18.3.4.5\] 18.3.6.1(5)(b) of NFPA 101 for direct supervision by the facility staff of nursing homes. \[101:A.18.3.4.5.3\]

13.7.2.8.3 Notification.

Positive alarm sequence in accordance with 13.7.1.9.4 \[101:18.3.4.3\] shall be permitted in health care occupancies protected throughout by an approved, supervised automatic sprinkler system in
accordance with NFPA 13. [101:19.3.4.3]

13.7.2.8.3.1 Occupant Notification.
Occupant notification shall be accomplished automatically in accordance with 13.7.1.9, unless otherwise modified by the following:

1. In lieu of audible alarm signals, visible alarm-indicating appliances shall be permitted to be used in critical care areas.
2. Where visual devices have been installed in patient sleeping areas in place of an audible alarm, they shall be permitted where approved by the AHJ.
3. The provision of 19.3.2.5.3(13)(c) of NFPA 101 shall be permitted to be used.
4. Where the private operating mode in accordance with NFPA 72 is used, alarm notification appliances shall not be required in patient care spaces where alarm notification adversely affects patient care.

[101:19.3.4.3.1]

A.13.7.2.8.3.1(4)
In health care occupancies, fire alarm system notification is often designed primarily to notify staff who are responsible for the occupants in their care. The staff can be used as an alternate means for notifying others who might need to relocate or evacuate. [101:A.19.3.4.3.1(4)]

13.7.2.8.3.2.1
Emergency forces notification shall be accomplished in accordance with 13.7.1.10, except that the provision of 19.3.2.5.3(13)(d) of NFPA 101 shall be permitted to be used. [101:19.3.4.3.2.1]

13.7.2.8.4 Emergency Control Functions.
Operation of any activating device in the required fire alarm system shall be arranged to accomplish automatically any control functions to be performed by that device. (See 13.7.1.11.) [101:19.3.4.4]

13.7.2.9.3.1 Occupant Notification.

13.7.2.9.3.1.1
Occupant notification shall be accomplished automatically, without delay, in accordance with 13.7.1.9 upon operation of any fire alarm activating device. [101:20.3.4.3.1.1]

13.7.2.9.3.1.2 *
Where the private operating mode in accordance with NFPA 72 is used, alarm notification appliances shall not be required in patient care spaces where alarm notification adversely affects patient care. [101:20.3.4.3.1.2]

A.13.7.2.9.3.1.2
In ambulatory health care occupancies, fire alarm system notification is often designed primarily to notify staff who are responsible for the occupants in their care. The staff can be used as an alternate means for notifying others who might need to relocate or evacuate. [101:A.20.3.4.3.1.2]

13.7.2.9.4 Emergency Control Functions.
Operation of any activating device in the required fire alarm system shall be arranged to accomplish automatically, without delay, any control functions required to be performed by that device. (See 13.7.1.11 13.7.1.12.) [101:20.3.4.4]

13.7.2.10.3 Notification.
Positive alarm sequence in accordance with 13.7.1.9.4 13.7.1.9.5 shall be permitted. [101:21.3.4.3]

13.7.2.10.3.1.1
Occupant notification shall be accomplished automatically, without delay, in accordance with 13.7.1.9 upon operation of any fire alarm activating device. [101:21.3.4.3.1.1]

13.7.2.10.3.1.2 *
Where the private operating mode in accordance with NFPA 72 is used, alarm notification appliances shall not be required in patient care spaces where alarm notification adversely affects patient care. [101:21.3.4.3.1.2]

A.13.7.2.10.3.1.2
In ambulatory health care occupancies, fire alarm system notification is often designed primarily to notify staff who are responsible for the occupants in their care. The staff can be used as an alternate means for notifying others who might need to relocate or evacuate. [101:21.3.4.3.1.2]

13.7.2.11.3.1 Occupant Notification.
Occupant notification shall be accomplished automatically in accordance with 13.7.1.9, and the following also shall apply:

(1) A positive alarm sequence shall be permitted in accordance with 13.7.1.9.4 13.7.1.9.5.
(2)* Any smoke detectors required by this chapter shall be permitted to be arranged to alarm at a constantly attended location only and shall not be required to accomplish general occupant notification. [101:22.3.4.3.1]

13.7.2.11.3.2.1
Fire department notification shall be accomplished in accordance with 13.7.1.10, unless otherwise permitted by one of the following:

(1) A positive alarm sequence shall be permitted in accordance with 13.7.1.9.4 13.7.1.9.5.
(2) Any smoke detectors required by this chapter shall not be required to transmit an alarm to the fire department.
(3) This requirement shall not apply where staff is provided at a constantly attended location that meets one of the following criteria:
   (a) It has the capability to promptly notify the fire department.
   (b) It has direct communication with a control room having direct access to the fire department.

[101:22.3.4.3.2.1]

13.7.2.12.3.1 Occupant Notification.
Occupant notification shall be accomplished automatically in accordance with 13.7.1.9, and the following also shall apply:

(1) A positive alarm sequence shall be permitted in accordance with 13.7.1.9.4 and 13.7.1.9.5.

(2)* Any smoke detectors required by this chapter shall be permitted to be arranged to alarm at a constantly attended location only and shall not be required to accomplish general occupant notification.

[101:23.3.4.3.1]

13.7.2.12.3.2.1
Fire department notification shall be accomplished in accordance with 13.7.1.10, unless otherwise permitted by one of the following:

(1) A positive alarm sequence shall be permitted in accordance with 13.7.1.9.4 and 13.7.1.9.5.

(2) Any smoke detectors required by this chapter shall not be required to transmit an alarm to the fire department.

(3) This requirement shall not apply where staff is provided at a constantly attended location that meets one of the following criteria:
   (a) It has the capability to promptly notify the fire department.
   (b) It has direct communication with a control room having direct access to the fire department.

[101:23.3.4.3.2.1]

13.7.2.13.2.1
Carbon monoxide alarms or carbon monoxide detectors in accordance with 13.7.1.14 and 13.7.1.15 shall be provided in new one- and two-family dwellings where either of the following conditions exists:

(1) Dwelling units with communicating attached garages, unless otherwise exempted by 13.7.2.13.2.3

(2) Dwelling units containing fuel-burning appliances or fuel-burning fireplaces

[101:24.3.4.2.1]

A.13.7.2.13.2.2
The placement requirements of NFPA 72 and NFPA 720 are modified specifically for one- and two-family dwellings as required by this Code and do not affect other regulations within a jurisdiction.
13.7.2.14.3.2
Positive alarm sequence in accordance with 13.7.1.9.4 shall be permitted. [101:26.3.4.3.2]

13.7.2.14.5.2
In other than existing buildings, the smoke alarms required by 13.7.2.14.5.1 shall be interconnected in accordance with 13.7.1.8.3. [101:26.3.4.5.2]

13.7.2.14.6.1
Carbon monoxide alarms or carbon monoxide detectors in accordance with 13.7.1.14 and 13.7.2.14.6 shall be provided in new lodging or rooming houses where either of the following conditions exists:

(1) Lodging or rooming houses with communicating attached garages, unless otherwise exempted by 13.7.2.14.6.3
(2) Lodging or rooming houses containing fuel-burning appliances or fuel-burning fireplaces

13.7.2.14.6.2 *
Where required by 13.7.2.14.6.1, carbon monoxide alarms or carbon monoxide detectors shall be installed in the following locations:

(1) Outside of each separate sleeping area in the immediate vicinity of the sleeping rooms
(2) On every occupiable level, including basements, and excluding attics and crawl spaces

A.13.7.2.14.6.2
The placement requirements of NFPA 72 NFPA 720 are modified to accommodate lodging or rooming house occupancies that are part of multiple occupancy buildings (e.g., an on-call physicians’ sleeping room in a hospital). The placement requirements of NFPA 72 NFPA 720 are modified specifically for lodging or rooming houses as required by this Code and do not affect other regulations within a jurisdiction. [101:A.26.3.4.6.2]

13.7.2.15.3.2
In hotels and dormitories that are required by 13.7.2.15 to have a fire alarm system, the audible alarm notification signal provided in sleeping rooms of guest rooms or guest suites that is activated by the fire alarm system shall be a 520 Hz low-frequency signal in accordance with 13.7.1.8.3. [101:28.3.4.3.2]

13.7.2.15.3.3
Positive alarm sequence in accordance with 13.7.1.9.5 shall be permitted. [101:28.3.4.3.32]

13.7.2.15.3.4 *

Updated: August 4, 2020  Standards Council Agenda - August 10-13, 2020
Guest rooms and guest suites specifically required and equipped to accommodate hearing-impaired individuals shall be provided with a visible notification appliance. [101]: 28.3.4.3.43

A.13.7.2.15.3.4A.13.7.2.15.3.3
A quantity of such rooms and suites might be required to be equipped to accommodate hearing-impaired individuals based on the total number of rooms in a transient lodging facility. (See 28 CFR 36, Appendix A, “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities.”) [101]: A.28.3.4.3.43

13.7.2.15.3.513.7.2.15.3.4
In occupiable areas, other than guest rooms and guest suites, visible notification appliances shall be provided. [101]: 28.3.4.3.54

13.7.2.15.3.613.7.2.15.3.5
Annunciation and annunciation zoning in accordance with 13.7.1.1313.7.1.14 shall be provided in buildings three or more stories in height or having more than 50 guest rooms or guest suites. Annunciation shall be provided at a location readily accessible from the primary point of entry for emergency response personnel. [101]: 28.3.4.3.65

13.7.2.15.3.713.7.2.15.3.6
Emergency forces notification shall be provided in accordance with 13.7.1.10. [101]: 28.3.4.3.76

A.13.7.2.15.5
Caution needs to be exercised in locating smoke alarms with regard to their proximity to bathrooms, cooking facilities, and HVAC outlets in order to prevent nuisance alarms. [101]: A.28.3.4.65

13.7.2.15.6.1
Carbon monoxide alarms or carbon monoxide detectors in accordance with 13.7.1.1413.7.1.15 and 13.7.2.15.6 shall be provided in new hotels and dormitories where either of the following conditions exists:

(1) Guest rooms or guest suites with communicating attached garages, unless otherwise exempted by 13.7.2.15.6.3
(2) Guest rooms or guest suites containing a permanently installed fuel-burning appliance or fuel-burning fireplace
[101]: 28.3.4.7.1

13.7.2.15.6.2
Where required by 13.7.2.15.6.1, carbon monoxide alarms or carbon monoxide detectors shall be installed on every occupiable level of a guest room and guest suite and in the immediate vicinity of the sleeping rooms in the following locations:

(1) Outside of each separate guest room or guest suite sleeping area in the immediate vicinity of the sleeping rooms
On every occupiable level of a guest room and guest suite

13.7.2.15.6.4
Where fuel-burning appliances or fuel-burning fireplaces are installed outside guest rooms or guest suites, carbon monoxide detectors shall be installed in accordance with the manufacturer’s published instructions in the locations specified as follows:

1. On the ceilings of rooms containing permanently in-stalled fuel-burning appliances or fuel-burning fireplaces
2. Centrally located within occupiable spaces served by the first supply air register from a permanently installed, fuel-burning HVAC system
3. Centrally located within occupiable spaces adjacent to a communicating attached garage

13.7.2.15.6.5
Where carbon monoxide detectors are installed in accordance with 13.7.2.15.6.4(1), the alarm signal shall be automatically transmitted to an approved on-site location or to an off-premises location in accordance with NFPA 72 NFPA 720.

13.7.2.15.7.1
A risk analysis in accordance with 13.7.1.1513.7.1.16 shall be performed for grades K through 12, college, or university dormitories with an occupant load greater than 100 to determine if a mass notification system is required.

13.7.2.16.3.2
Positive alarm sequence in accordance with 13.7.1.9.413.7.1.9.5, and a presignal system in accordance with 13.7.1.9.313.7.1.9.4, shall be permitted.

13.7.2.16.6 Carbon Monoxide Alarms and Carbon Monoxide Detection Systems.
Where required by 29.3.4.6.1, carbon monoxide alarms or carbon monoxide detectors shall be installed on every occupiable level of a guest room and guest suite and in the immediate vicinity of the sleeping rooms. [101:29.3.4.6.2]

**13.7.2.16.6.3**
Carbon monoxide alarms and carbon monoxide detectors as specified in 13.7.2.16.6.1(1) shall not be required in the following locations:

1. In garages
2. Within guest rooms or guest suites with communicating attached garages that are open parking structures as defined by the building code
3. Within guest rooms or guest suites with communicating attached garages that are mechanically ventilated in accordance with the mechanical code [101:29.3.4.6.3]

**13.7.2.16.6.4**
Where fuel-burning appliances or fuel-burning fireplaces are installed outside guest rooms or guest suites, carbon monoxide detectors shall be installed in accordance with the manufacturer’s published instructions in the locations specified as follows:

1. On the ceilings of rooms containing permanently installed fuel-burning appliances or fuel-burning fireplaces
2. Centrally located within occupiable spaces served by the first supply air register from a permanently installed, fuel-burning HVAC system
3. Centrally located within occupiable spaces adjacent to a communicating attached garage [101:29.3.4.6.4]

**13.7.2.16.6.5**
Where carbon monoxide detectors are installed in accordance with 13.7.2.16.6.4, the alarm signal shall be automatically transmitted to an approved on-site location or to an off-premises location in accordance with NFPA 72. [101:29.3.4.6.5]

**13.7.2.17.1.1**
New apartment buildings four or more stories in height or with more than 11 dwelling units, other than those meeting the requirements of 13.7.2.17.1.2, shall be provided with a fire alarm system in accordance with Section 13.7, except as modified by 13.7.2.17.2 through 13.7.2.17.65. [101:30.3.4.1.1]

**13.7.2.17.3.1**
Occupant notification shall be provided automatically in accordance with Section 13.7, and both of the following shall also apply:

1. Visible signals shall be installed in units designed for the hearing impaired.
2. Positive alarm sequence in accordance with 13.7.1.9.413.7.1.9.5 shall be permitted. [101:30.3.4.3.1]

**13.7.2.17.3.2** *
In apartment buildings that are required by 13.7.2.17.1 to have a fire alarm system, the audible alarm notification signal provided in sleeping rooms of dwelling units that is activated by the fire alarm system shall be a 520 Hz low-frequency signal in accordance with 13.7.1.9.9. [101:30.3.4.3.2]

A.13.7.2.17.3.2
The standard audible alarm signal used in all fire alarm horns and integral sounders of smoke detectors for the past 30 years utilized a typical frequency of approximately 3 KHz. Peer-reviewed research has concluded the waking effectiveness of a 520 Hz low-frequency signal is superior to the standard 3 KHz audible alarm signal for waking high-risk segments of the population such as people over 65, people who are hard of hearing, school-age children, and people who are alcohol impaired. Therefore, the 520 Hz low-frequency audible alarm signal is now required in areas intended for sleeping within apartment buildings that are required to have a fire alarm system. The following product solutions are currently available in the market to produce the 520 Hz low-frequency audible alarm signal in sleeping rooms:

1. Smoke detectors with integral sounder bases
2. Fire alarm system horns and horn/strobes
3. Speakers connected to an in-building fire alarm emergency voice alarm communication (EVAC) system

[101:A.30.3.4.3.2]

The peer-reviewed research project — Optimizing Fire Alarm Notification for High Risk Groups: Waking Effectiveness of Alarms (Auditory, Visual and Tactile) for Adults Who Are Hard of Hearing and Waking Effectiveness of Alarms (Auditory, Visual and Tactile) for the Alcohol Impaired — was conducted under the auspices of the Fire Protection Research Foundation. [101:A.30.3.4.3.2]

13.7.2.17.3.3
Annunciation, and annunciation zoning, in accordance with 13.7.1.13 shall be provided, unless the building complies with either 13.7.2.17.3.43 or 13.7.2.17.3.54. Annunciation shall be provided at a location readily accessible from the primary point of entry for emergency response personnel.

[101:30.3.4.3.32]

13.7.2.17.3.43
Annunciation, and annunciation zoning, shall not be required in buildings two or fewer stories in height and having not more than 50 dwelling units. [101:30.3.4.3.43]

13.7.2.17.3.54
Annunciation, and annunciation zoning, shall not be required in buildings four or fewer stories in height containing not more than 16 dwelling units and protected throughout by an approved, supervised automatic sprinkler system installed in accordance with 13.3.2.17. [101:30.3.4.3.54]

13.7.2.17.3.65
Emergency forces notification shall be accomplished in accordance with 13.7.1.10. [101:30.3.4.3.65]

13.7.2.17.5.1 *
In apartment buildings that are required by 13.7.2.17 to have a fire alarm system, the audible alarm notification signal provided in sleeping rooms that is activated by smoke alarms shall be a 520 Hz low-frequency signal in accordance with 13.7.1.8.3. [101]:30.3.4.5.1

A.13.7.2.17.5.1
The standard audible alarm signal used in all smoke alarms for the past 30 years utilized a typical frequency of approximately 3 KHz. Peer-reviewed research has concluded the waking effectiveness of the 520 Hz low-frequency signal is superior to the standard 3 KHz audible alarm signal for waking high-risk segments of the population such as people over 65, people who are hard of hearing, school-age children, and people who are alcohol impaired. Therefore, the 520 Hz low-frequency audible alarm signal is now required for smoke alarms in areas intended for sleeping within apartment buildings that are required to have a fire alarm system. If smoke alarms that are capable of producing the low-frequency audible alarm signal are not available, smoke detectors arranged to function in the same manner as smoke alarms in accordance with 13.7.1.8.6 would be required. The following product solutions are currently available in the market if the smoke alarm is unable to produce the 520 Hz low-frequency audible alarm signal in sleeping rooms:

1. Smoke detectors with integral sounder bases
2. Fire alarm system horns and horn/strobes
3. Speakers connected to an in-building fire alarm emergency voice alarm communication (EVAC) system

[101]:A.30.3.4.5.1

The peer-reviewed research project — Optimizing Fire Alarm Notification for High Risk Groups: Waking Effectiveness of Alarms (Auditory, Visual and Tactile) for Adults Who Are Hard of Hearing and Waking Effectiveness of Alarms (Auditory, Visual and Tactile) for the Alcohol Impaired — was conducted under the auspices of the Fire Protection Research Foundation. [101]:A.30.3.4.5.1

13.7.2.17.6.1
Carbon monoxide alarms or carbon monoxide detectors in accordance with 13.7.1.14, 13.7.1.15 and 13.7.2.17.6 shall be provided in new apartment buildings where either of the following conditions exists:

1. Dwelling units with communicating attached garages, unless otherwise exempted by 13.7.2.17.6.3
2. Dwelling units containing a permanently installed fuel-burning appliance or fuel-burning fireplace

[101]:30.3.4.6.1

13.7.2.17.6.4 *
Where fuel-burning appliances or fuel-burning fireplaces are installed outside dwelling units, carbon monoxide detectors shall be installed in accordance with the manufacturer’s published instructions in the locations specified as follows:

1. On the ceilings of rooms containing permanently in-stalled fuel-burning appliances or fuel-burning fireplaces
2. Centrally located position within occupiable spaces served by the first supply air register from a permanently installed, fuel-burning HVAC system
Centrally located position within occupiable spaces adjacent to a communicating attached garage

A.13.7.2.17.6.4
Where fuel-burning appliances or fuel-burning fireplaces are located outside but attached to the dwelling unit, the area or room containing the fuel-burning appliance or fuel-burning fireplace could be considered part of the attached dwelling unit(s). In this application, either carbon monoxide alarms or carbon monoxide detectors are permitted to be installed in the attached dwelling unit(s) in accordance with 30.3.4.4.13.7.2.17.6.4(1). [101:30.3.4.6.4]

13.7.2.17.6.5
Where carbon monoxide detectors are installed in accordance with 13.7.2.17.6.4(1), the alarm signal shall be automatically transmitted to an approved on-site location or to an off-premises location in accordance with NFPA 72. [101:30.3.4.6.5]

13.7.2.18.1.2
A fire alarm system shall not be required where each dwelling unit is separated from other contiguous dwelling units by fire barriers (see Section 12.7) having a minimum 1/2-hour fire resistance rating, and where each dwelling unit has either its own independent exit or its own independent stairway or ramp discharging at the finished ground level. [101:31.3.4.1.2]

13.7.2.18.4.1 *
In buildings using Option 2 as defined by NFPA 101, a complete automatic fire detection system in accordance with 9.6.1.32.9 of NFPA 101 and 13.7.2.18.4.2 shall be required. [101:31.3.4.4.1]

A.13.7.2.18.4.1
It is intended that a building compliant with Option 2, as defined in Chapter 31 of NFPA 101, function as described in the paragraph that follows. [101:A.31.3.4.4.1]

Occupants within a living unit become aware of a fire emergency, either through personal awareness or through being alerted by the smoke alarm(s) installed within the living unit. Other building occupants are alerted to the fire emergency by the building fire alarm system that is initiated by manual fire alarm boxes adjacent to the exits, heat detection within the living unit where the fire emergency exists, smoke detection in the common areas outside the living unit, or a combination thereof. The installation of system heat detectors versus smoke detectors within the living unit is intended to eliminate nuisance-type alarms and reduce occupant complacency from frequent false alarms. The installation of smoke detection within the living unit should only be contemplated after a careful analysis of the goals and with the approval of the AHJ. [101:A.31.3.4.4.1]

13.7.2.18.4.2
Automatic fire detection devices shall be in-stalled as follows:
Smoke detectors shall be installed in all common areas and work spaces outside the living unit, such as exit stairs, egress corridors, lobbies, storage rooms, equipment rooms, and other tenantless spaces in environments that are suitable for proper smoke detector operation.

(2) Heat detectors shall be located within each room of the living unit.

13.7.2.19.1 General.
A fire alarm system shall be provided in accordance with Section 13.7. [101:32.2.3.4.1]

13.7.2.19.3 General.
A manual fire alarm system shall be provided in accordance with Section 13.7. [101:32.2.3.4.1]

13.7.2.19.34 Occupant Notification.
Occupant notification shall be provided automatically, without delay, in accordance with 13.7.1.9. [101:32.2.3.4.2-32.2.3.4.3]

13.7.2.19.4 Carbon Monoxide Alarms and Carbon Monoxide Detection Systems.

13.7.2.19.4.1 Carbon monoxide alarms or carbon monoxide detectors in accordance with 13.7.1.15 and 13.7.2.19.4 shall be provided in new, small board and care facilities where either of the following conditions exists:

(1) Where small board and care facilities have communicating attached garages, unless otherwise exempted by 13.7.2.19.4.3

(2) Where small board and care facilities contain fuel-burning appliances or fuel-burning fireplaces

[101:32.2.3.4.4.1]

13.7.2.19.4.2 Where required by 13.7.2.19.4.1, carbon monoxide alarms or carbon monoxide detectors shall be installed in the following locations:

(1) Outside each separate sleeping area in the immediate vicinity of the sleeping rooms

(2) Within sleeping rooms containing fuel-burning appliances or fuel-burning fireplaces

(3) On every occupiable level, including basements and excluding attics and crawl spaces

(4) Centrally located within occupiable spaces adjacent to a communicating attached garage, unless otherwise exempted by 13.7.2.19.4.3

[101:32.2.3.4.4.2]

13.7.2.19.4.3 Carbon monoxide alarms and carbon monoxide detectors as specified in 13.7.2.19.4.1(1) shall not be required in the following locations:

(1) In garages

(2) Within small board and care facilities with communicating attached garages that are open parking structures as defined by the building code
Within small board and care facilities with communicating attached garages that are mechanically ventilated in accordance with the mechanical code.

Additional smoke alarms shall be installed in all living areas, as defined in §101:32.2.3.4.5.3 of NFPA 101.

A fire alarm system shall be provided in accordance with Section 13.7. [101:32.3.3.4.1]

Emergency forces notification shall meet the following requirements:

1. Emergency forces notification shall be accomplished in accordance with 13.7.1.10.
2. Smoke detection devices or smoke detection systems shall be permitted to initiate a positive alarm sequence in accordance with §101:32.3.3.4.6 for not more than 120 seconds.

Approved smoke alarms shall be installed in accordance with 13.7.1.8 inside every sleeping room, outside every sleeping area in the immediate vicinity of the bedrooms, and on all levels within a resident unit. [101:32.3.3.4.7.1]

Smoke alarms shall not be required to be installed in locations where smoke detection is otherwise required per 13.7.2.20.8. [101:32.3.3.4.7.2]

Carbon monoxide alarms or carbon monoxide detectors in accordance with §101:32.3.3.4.9.1 shall be provided in new large board and care facilities where either of the following conditions exists:

1. Where large board and care facilities have communicating attached garages, unless otherwise exempted by 13.7.2.20.9.3
2. Where sleeping rooms or sleeping room suites contain fuel-burning appliances or fuel-burning fireplaces are in the facility

Where required by 13.7.2.20.9.1, carbon monoxide alarms or carbon monoxide detectors shall be installed in the following locations:

1. Within rooms containing fuel-burning appliances or fuel-burning fireplaces, unless otherwise exempted by 12.7.2.20.9.4 Outside each separate sleeping room area in the immediate vicinity of the sleeping rooms.
(2) Centrally located within occupiable spaces served by the first supply air register from a sleeping rooms containing fuel-burning appliances or fuel-burning fireplaces HVAC system

(3) On every occupiable level of a sleeping room and sleeping room suite

(4) Centrally located within occupiable spaces adjacent to a communicating occupiable spaces to an attached garage, unless otherwise exempted by 13.7.2.20.9.3

13.7.2.20.9.3
Carbon monoxide alarms and carbon monoxide detectors as specified in 13.7.2.20.9.1(1) shall not be required in the following locations:

(1) In garages
(2) Within facilities with communicating attached garages that are open parking structures as defined by the building code
(3) Within facilities with communicating attached garages that are mechanically ventilated in accordance with the mechanical code

13.7.2.20.9.4
Where resident units containing fuel-burning appliances or fuel-burning fireplaces are installed outside sleeping rooms, carbon monoxide alarms or carbon monoxide detectors shall be permitted to be used, installed in the locations specified as follows:

(1) Within rooms containing fuel-burning appliances or fuel-burning fireplaces
(2) Centrally located within occupiable spaces served by the first supply air register from a fuel-burning HVAC system

A.13.7.2.21.4
Most often, smoke alarms sounding an alarm at 85 dBA or greater, installed outside the bedroom area, will meet the intent of this requirement. Smoke alarms remotely located from the bedroom might not be loud enough to awaken the average person. In such cases, it is recommended that smoke alarms be interconnected so that the activation of any smoke alarm will cause all smoke alarms to activate.
NFPA 101 provides adequate, balanced fire protection and takes into consideration the passive and active systems required in a given occupancy. The level of protection prescribed by NFPA 72 which includes smoke alarms in all sleeping rooms, without exception, does not necessarily take into consideration the complete protection package prescribed by NFPA 101. [101:A.33.2.3.4.43]

13.7.2.21.4.1
Approved smoke alarms shall be provided in accordance with 13.7.1.8, unless otherwise indicated in 13.7.2.21.4.6 and 13.7.2.21.4.7. [101:33.2.3.4.41]

13.7.2.21.4.2
Smoke alarms shall be installed on all levels, including basements but excluding crawl spaces and unfinished attics. [101:33.2.3.4.43.2]

13.7.2.21.4.3
Additional smoke alarms shall be installed for living rooms, dens, day rooms, and similar spaces. [101:33.2.3.4.43.3]

13.7.2.21.4.5
Smoke alarms shall be powered from the building electrical system and, when activated, shall initiate an alarm that is audible in all sleeping areas. [101:33.2.3.4.43.5]

13.7.2.21.4.6
Smoke alarms in accordance with 13.7.2.21.4.1, 13.7.2.21.4.2, and 13.7.2.21.4.3 shall not be required where buildings are protected throughout by an approved automatic sprinkler system, in accordance with 13.3.2.22.2, that uses quick-response or residential sprinklers, and are protected with approved smoke alarms installed in each sleeping room, in accordance with 13.7.1.8, that are powered by the building electrical system. [101:33.2.3.4.43.6]

13.7.2.21.4.7
Smoke alarms in accordance with 13.7.2.21.4.1, 13.7.2.21.4.2, and 13.7.2.21.4.3 shall not be required where buildings are protected throughout by an approved automatic sprinkler system, in accordance with 13.3.2.22.2, that uses quick-response or residential sprinklers, with existing battery-powered smoke alarms in each sleeping room, and where, in the opinion of the AHJ, the facility has demonstrated that testing, maintenance, and a battery replacement program ensure the reliability of power to the smoke alarms. [101:33.2.3.4.43.7]

13.7.2.22.8.1
All living areas, as defined in 3.3.224.5 of NFPA 101, and all corridors shall be provided with smoke detectors that comply with NFPA 72 and are arranged to initiate an alarm that is audible in all sleeping areas, as modified by 13.7.2.22.8.2 and 13.7.2.22.8.3. [101:33.3.3.4.8.1]
13.7.2.23.3.1 Occupant Notification.
During all times that the mercantile occupancy is occupied, the required fire alarm system, once initiated, shall perform one of the following functions:

1. It shall activate an alarm in accordance with 13.7.1.9 throughout the mercantile occupancy.
2. Positive alarm sequence in accordance with 13.7.1.9.4 shall be permitted.

13.7.2.24.3.1 Occupant Notification.
During all times that the mercantile occupancy is occupied, the required fire alarm system, once initiated, shall perform one of the following functions:

1. It shall activate an alarm in accordance with 13.7.1.9 throughout the mercantile occupancy, and both of the following also shall apply:
   a. Positive alarm sequence in accordance with 13.7.1.9.4 shall be permitted.
   b. A presignal system in accordance with 13.7.1.9.3 shall be permitted.
2. Occupant notification shall be made via a voice communication or public address system in accordance with 13.7.1.9.2.

13.7.2.25.1 General.
A fire alarm system in accordance with Section 13.7 shall be provided in all new business occupancies where any one of the following conditions exists:

1. The building is three or more stories in height.
2. The occupancy is subject to 50 or more occupants above or below the level of exit discharge.
3. The occupancy is subject to 300 or more total occupants.

13.7.2.25.3 Occupant Notification.
During all times that the building is occupied (see 7.2.1.1.3 of NFPA 101), the required fire alarm system, once initiated, shall perform one of the following functions:

1. It shall activate a general alarm in accordance with 13.7.1.9.
2. A positive alarm sequence in accordance with 13.7.1.9.5 shall be permitted.

13.7.2.25.5 *Risk Analysis for Mass Notification.

13.7.2.25.5.1 Business occupancies requiring a fire alarm system in accordance with 13.7.2.25.5.1 shall conduct a risk analysis to determine the need for a mass notification system in accordance with 13.7.1.15.

13.7.2.25.5.2 *A risk analysis to determine the need for a mass notification system in accordance with
Section 13.7.1.15 shall be performed for new business occupancies conducted for buildings containing a classroom where the building is owned, rented, leased, or operated by a college or university to determine whether a mass notification system is required. [101:38.3.4.5.2]

A.13.7.2.25.5.2
It is not the intent of this section paragraph to require a new risk analysis where an existing risk analysis addresses the issues or arrangements associated with a new building. [101:A.38.3.4.5.2]

13.7.2.26.3 Occupant Notification.
During all times that the building is occupied (see 7.2.1.1.3 of NFPA 101), the required fire alarm system, once initiated, shall perform one of the following functions:

(1) It shall activate a general alarm in accordance with 13.7.1.9, and both of the following also shall apply:
   (a) Positive alarm sequence in accordance with 13.7.1.9.4 shall be permitted.
   (b) A presignal system in accordance with 13.7.1.9.5 shall be permitted.
(2) Occupant notification shall be permitted to be made via a voice communication or public address system in accordance with 13.7.1.9.10.2.

13.7.2.27.3.2
Positive alarm sequence in accordance with 13.7.1.9.4 shall be permitted. [101:40.3.4.3.2]

13.7.2.27.3.3
Existing presignal systems in accordance with 13.7.1.9.5 shall be permitted. [101:40.3.4.3.3]

13.7.2.28.1.1
Storage occupancies limited to low-hazard contents shall not be required to have a fire alarm system. [101:42.3.4.1.1]

13.7.2.28.1.2
Storage occupancies with ordinary- or high-hazard contents not exceeding an aggregate floor area of 100,000 ft² (9300 m²) shall not be required to have a fire alarm system. [101:42.3.4.1.2]

13.7.2.28.3.2
Positive alarm sequence in accordance with 13.7.1.9.4 shall be permitted. [101:42.3.4.3.2]

13.7.2.28.3.3
Existing presignal systems in accordance with 13.7.1.9.5 shall be permitted. [101:42.3.4.3.3]

13.7.2.28.3.4
In high-hazard storage occupancies, the required fire alarm system shall automatically initiate an occupant evacuation alarm signal in accordance with 13.7.1.9. [101:42.3.4.3.4]
13.7.2.29.1 Open Structures.

Open structures shall be exempt from the requirement for detection, alarm, and communications systems. [101:11.2.3.4]

13.7.2.29.2 Detection, Alarm, and Communications SystemsTowers.

Towers, as defined in 3.3.281 of NFPA 101, designed for occupancy by not more than three persons shall be exempt from requirements for detection, alarm, and communications systems. [101:11.3.3.4]

13.7.2.29.2.2.1

Two-way telephone communication service shall be provided for fire department use. This system shall be in accordance with NFPA 72. The communications system shall operate between the emergency command center and every elevator car, every elevator lobby, and each floor level of exit stairs. [101:11.8.4.2.1]

13.7.2.29.2.2.1.1

The two-way telephone communication system shall be in accordance with NFPA 72. [101:11.8.4.2.1.1]

13.7.2.29.2.2.1.2

The two-way telephone communication system shall operate between the emergency command center and every elevator car, every elevator lobby, and each floor level of exit stairs. [101:11.8.4.2.1.2]

13.7.2.29.2.2.2*

The requirement of 13.7.2.29.2.2.1 shall not apply where the fire department radio system is approved as an equivalent system. [101:11.8.4.2.2]

13.7.2.29.2.3 Risk Analysis for Mass Notification Systems.

For high-rise buildings with a total occupant load of 5000 or more persons, or where the floor of an occupiable story is greater than 420 ft (128 m) above the lowest level of fire department vehicle access, a risk analysis in accordance with 13.7.1.16 shall be performed to determine whether a mass notification system is required. [101:11.8.4.3]

14.3.1

Where this Code requires an exit to be separated from other parts of the building, the separating construction shall meet the requirements of Section 8.2 of NFPA 101 and the following:

(1)* The separation shall have a minimum 1-hour fire resistance rating where the exit connects three or fewer stories.

(2) The separation specified in 14.3.1(1), other than an existing separation, shall be supported by construction having not less than a 1-hour fire resistance rating.

(3)* The separation shall have a minimum 2-hour fire resistance rating where the exit connects four or more stories, unless one of the following conditions exists:
(a) In existing non-high-rise buildings, existing exit stair enclosures shall have a minimum 1-hour fire resistance rating.

(b) In existing buildings protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3, existing exit stair enclosures shall have a minimum 1-hour fire resistance rating.

(c) The minimum 1-hour enclosures in accordance with 28.2.2.1.2, 29.2.2.1.2, 30.2.2.1.2, and 31.2.2.1.2 of NFPA 101 shall be permitted as an alternative to the requirement of 14.3.1(3).

(4) Reserved.

(5) The minimum 2-hour fire resistance-rated separation required by 14.3.1(3) shall be constructed of an assembly of noncombustible or limited-combustible materials and shall be supported by construction having a minimum 2-hour fire resistance rating, unless otherwise permitted by 14.3.1(67).

(65)* Structural elements, or portions thereof, that support exit components and either penetrate into a fire-rated assembly or are installed within a fire-rated wall assembly shall be protected, as a minimum, to the fire resistance rating required by 14.3.1(1) or 14.3.1(3).

(76) Fire-retardant-treated wood enclosed in noncombustible or limited-combustible materials shall be permitted in accordance with NFPA 220.

(87) Openings in the separation shall be protected by fire door assemblies equipped with door closers complying with 14.5.4.

(98)* Openings in exit enclosures shall be limited to door assemblies from normally occupied spaces and corridors and door assemblies for egress from the enclosure, unless one of the following conditions exists:

(a) Vestibules that separate normally unoccupied spaces from an exit enclosure shall be permitted provided the vestibule is separated from adjacent spaces by corridor walls and related opening protectives as required for the occupancy involved but not less than a smoke partition in accordance with Section 8.4 of NFPA 101.

(b) In buildings of Type I or Type II construction as defined in NFPA 220 (see 8.2.1.2 of NFPA 101), fire-protection-rated door assemblies to normally unoccupied building service equipment support areas as addressed in Section 7.143 of NFPA 101 shall be permitted, provided the space is separated from the exit enclosure by fire barriers as required by 14.3.1(3).

(c) Openings in exit passageways in mall buildings as provided in Chapters 36 and 37 of NFPA 101 shall be permitted.

(d) In buildings of Type I or Type II construction, as defined in NFPA 220 (see 8.2.1.2 of NFPA 101), existing fire-protection-rated door assemblies to interstitial spaces shall be permitted, provided that such spaces meet all of the following criteria:

i. The space is used solely for distribution of pipes, ducts, and conduits.

ii. The space contains no storage.

iii. The space is separated from the exit enclosure in accordance with Section 12.7.

(e) Existing openings to mechanical equipment spaces protected by approved existing fire-protection-rated door assemblies shall be permitted, provided that the following criteria are met:

i. The space is used solely for non-fuel-fired mechanical equipment.
ii. The space contains no storage of combustible materials.

iii. The building is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3 or the mechanical equipment space is provided with sprinkler protection in accordance with Section 13.3 and provided with complete smoke detection in accordance with Section 13.7.

Penetrations into, and openings through, an exit enclosure assembly shall be limited to the following:

(a) Door assemblies permitted by 14.3.1(89)
(b)* Electrical conduit serving the exit enclosure
(c) Pathways for devices for security and communication systems serving the exit enclosure, where pathways are installed in metal conduit
(d)* Required exit door openings
(e) Ductwork and equipment necessary for independent stair pressurization
(f) Water or steam piping necessary for the heating or cooling of the exit enclosure
(g) Sprinkler piping
(h) Standpipes
(i) Existing penetrations
(j) Penetrations for fire alarm circuits, where the circuits are installed in metal conduit

Penetrations or communicating openings shall be prohibited between adjacent exit enclosures.

All penetrations in fire barriers separating the exit from other parts of the building shall be protected in accordance with 12.7.8.

Membrane penetrations shall be permitted on the exit access side of the exit enclosure and shall be protected in accordance with 12.7.5.6.

A.14.3.1(1)

In existing buildings, existing walls in good repair and consisting of lath and plaster, gypsum wallboard, or masonry units can usually provide satisfactory protection for the purposes of this requirement where a 1-hour fire resistance rating is required. Further evaluation might be needed where a 2-hour fire resistance rating is required. Additional guidelines can be found in Annex O of NFPA 914 and in the SFPE Handbook of Fire Protection Engineering. [101:A.7.1.3.2.1(1)]

A.14.3.1(65)

It is not the intent to require the structural elements supporting outside stairs, or structural elements that penetrate within exterior walls or any other wall not required to have a fire resistance rating, to be protected by fire-resistance-rated construction. [101:A.7.1.3.2.1(56)]

A.14.3.1(98)

Means of egress from the level of exit discharge is permitted to pass through an exit stair enclosure or exit passageway serving other floors. Doors for convenience purposes and unrelated to egress also are permitted to provide access to and from exit stair enclosures and exit passageways, provided that such
doors are from corridors or normally occupied spaces. It is also the intent of this provision to prohibit exit enclosure windows, other than approved vision panels in doors, that are not mounted in an exterior wall. [101:A.7.1.3.2.1(89)]

A.14.3.1(910)(b)
The intent of this provision is to prevent the exit enclosure from being used as a vertical chase for building services. Penetrations for electrical wiring are permitted where the wiring serves equipment permitted by the AHJ to be located within the exit enclosure. [101:A.7.1.3.2.1(910)(b)]

A.14.3.1(910)(d)
This provision will allow security cameras, public address systems, emergency communication systems, telephone repeaters and similar life safety devices in the exit enclosure, and wiring and similar pathways for such devices, to penetrate the fire barrier serving the exit enclosure. It is the intent of this provision to prevent the exit enclosure from being used as a vertical chase for building services. [101:A.7.1.3.2.1(10)(d)]

14.5.1.1 *Swinging-Type Door Assembly Requirement.*
Any door assembly in a means of egress shall be of the side-hinged or pivoted-swinging type, and shall be installed to be capable of swinging from any position to the full required width of the opening in which it is installed, unless otherwise specified as follows:

1. Door assemblies in dwelling units, as provided in Chapter 24 of NFPA 101, shall be permitted.
2. Door assemblies in residential board and care occupancies, as provided in Chapters 32 and 33 of NFPA 101, shall be permitted.
3. Where permitted in Chapters 11 through 43 of NFPA 101, horizontal or vertical-rolling security grilles or door assemblies that are part of the required means of egress, where permitted in Chapters 11 through 43 of NFPA 101, shall be permitted, provided that all of the following criteria are met:
   a. Such grilles or door assemblies shall remain secured in the fully open position during the period of occupancy by the general public.
   b. On or adjacent to the grille or door opening, there shall be a readily visible, durable sign in letters not less than 1 in. (25 mm) high on a contrasting background that reads as follows: THIS DOOR TO REMAIN OPEN WHEN THE SPACE IS OCCUPIED.
   c. Door leaves or grilles shall not be brought to the closed position when the space is occupied.
   d. Door leaves or grilles shall be operable from within the space without the use of any special knowledge or effort.
   e. Where two or more means of egress are required, not more than half of the means of egress shall be equipped with horizontal-sliding or vertical-rolling grilles or door assemblies.
4. Horizontal-sliding door assemblies shall be permitted under any of the following conditions:
   a. Horizontal-sliding door assemblies in detention and correctional occupancies, as provided in Chapters 22 and 23 of NFPA 101, shall be permitted.
   b. Special-purpose horizontally sliding accordion or folding door assemblies complying with 7.2.1.134 of NFPA 101 shall be permitted.
Unless prohibited by Chapters 11 through 43 of NFPA 101, horizontal-sliding door assemblies serving a room or area with an occupant load of fewer than 10 shall be permitted, provided that all of the following criteria are met:

i. The area served by the door assembly has no high-hazard contents.

ii. The door assembly is readily operable from either side without special knowledge or effort.

iii. The force required to operate the door assembly in the direction of door leaf travel is not more than 30 lbf (133 N) to set the door leaf in motion and is not more than 15 lbf (67 N) to close the door assembly or open it to the minimum required width.

iv. The door assembly complies with any required fire protection rating, and, where rated, is self-closing or automatic-closing by means of smoke detection in accordance with 14.5.4 and is installed in accordance with NFPA 80.

v. Corridor door assemblies required to be self-latching shall have a latch or other mechanism that ensures that the door leaf will not rebound into a partially open position if forcefully closed.

Where private garages, business areas, industrial areas, and storage areas with an occupant load not exceeding 10 contain only low- or ordinary-hazard contents, door openings to such areas and private garages shall be permitted to be horizontal-sliding door assemblies.

Vertical-rolling door assemblies shall be permitted in door openings to where private garages, business areas, industrial areas, and storage areas with where such areas have an occupant load not exceeding 10 and contain only low or ordinary hazard contents, door openings to such areas and private garages shall be permitted to be vertical-rolling door assemblies.

Revolving door assemblies complying with 7.2.1.10 of NFPA 101 shall be permitted.

Existing fusible link–operated horizontal-sliding or vertical-rolling fire door assemblies shall be permitted to be used as provided in Chapters 39, 40, and 42 of NFPA 101.

A.14.5.1.1

Where doors are subject to two-way traffic, or where their opening can interfere with pedestrian traffic, an appropriately located vision panel can reduce the chance of accidents. [101:A.7.2.1.4.1]

Swinging doors in horizontal- or vertical-rolling partitions complying with the following should be permitted in a means of egress where the following criteria are met:

(1) The door or doors comply with 14.5.1.

(2) The partition in which the doors are mounted complies with the applicable fire protection rating and closes upon smoke detection or power failure at a speed not exceeding 9 in./s (230 mm/s) and not less than 6 in./s (150 mm/s).

(3) The doors mounted in the partition are self-closing or automatic-closing in accordance with 14.5.4.1.

Pivoted-swinging-type doors include balanced doors. [101:A.7.2.1.4.1]

A.14.5.1.2
See 7.4.2.1.2 and 7.4.2.2.2 of NFPA 101 for door swing direction requirements for working space about electrical equipment. [101:A.7.2.1.4.2]

14.5.1.3* Door Leaf Encroachment.

A.14.5.1.3.1A.14.5.1.3
The requirements of 14.5.1.3 are not intended to apply to the swing of cross-corridor doors, such as smoke barrier doors and horizontal exits. Neither are the requirements intended to apply to doors from rooms that are typically unoccupied, such as janitor's closets, electrical closets, or telecommunications closets. [101:A.7.2.1.4.3-1]

14.5.1.3.1*
During its swing, any door leaf in a means of egress shall leave not less than one-half of the required width of an aisle, a corridor, a passageway, or a landing unobstructed, unless both of the following conditions are met:

1. The door opening provides access to a stair in an existing building.
2. The door opening meets the requirement of 14.5.1.3.2. [101:7.2.1.4.3.1]

14.5.1.5 Door Unlatching and Leaf Operating Forces.

14.5.1.5.1
The forces required to fully unlock and unlatch any door leaf manually in a means of egress shall not exceed 15 lbf (67 N) where the door hardware operates by push, pull, or slide, or 28 in.-lbf (3.16 N-m) where the door hardware operates by rotation. [101:7.2.1.4.5.1]

14.5.1.5.2
The forces required to fully open any door leaf manually in a means of egress shall not exceed 15 lbf (67 N) to release the latch, 30 lbf (133 N) to set the leaf in motion, and 15 lbf (67 N) to open the leaf to the minimum required width, unless otherwise specified as follows:

1. The door opening forces for interior side-hinged or pivoted-swinging door leaves without closers shall not exceed 5 lbf (22 N). [101:7.2.1.4.5.1-2]
2. The door opening forces for existing door leaves in existing buildings shall not exceed 50 lbf (222 N) applied to the latch stile.
3. The door opening forces for horizontal-sliding door leaves in detention and correctional occupancies shall be as provided in Chapters 22 and 23 of NFPA 101.
4. The opening forces for power-operated door leaves shall be as provided in 7.2.1.9 of NFPA 101. [101:7.2.1.4.5.1-4]

14.5.1.5.3
The forces specified in 14.5.1.5 shall be applied to the latch stile. [101:7.2.1.4.5.27.2.1.4.5.3]
14.5.2 Locks, and Latches, and Alarm Devices.

14.5.2.3 14.5.2.2
Locks and latches, if provided, shall not require the use of a key, a tool, or special knowledge or effort for operation from the egress side. [101:7.2.1.5.3, 14.5.2.2]

14.5.2.10 14.5.2.3 * Latch-Release Devices
A All locks, latches, and all or other fastening devices on a door leaf shall be provided with a releasing device that has an obvious method of operation and that is readily operated under all lighting conditions. [101:7.2.1.5.1, 14.5.2.3]

A.14.5.2.10A 14.5.2.3
Examples of devices that might be arranged to release locks and latches include knobs, levers, and bars. This requirement is permitted to be satisfied by the use of conventional types of hardware, whereby the door is released by turning a lever, knob, or handle or by pushing against a bar, but not by unfamiliar methods of operation such as a blow to break glass. It is also within the intent of this requirement that switches integral to traditional doorknobs, lever handles, or bars, and that interrupt the power supply to an electromagnetic lock, be permitted, provided that they are affixed to the door leaf. The operating devices should be capable of being operated with one hand and should not require tight grasping, tight pinching, or twisting of the wrist to operate. [101:A.7.2.1.5.3]

14.5.2.3.2 14.5.2.10.2 *
The releasing mechanism for any locks and latches shall be located as follows:

(1) Not less than 34 in. (865 mm) above the finished floor for other than existing installations
(2) Not more than 48 in. (1220 mm) above the finished floor

A.14.5.2.3.2
An example of a releasing motion in a single linear direction, as described in ANSI/BHMA A156.41, Standard for Door Hardware Single Motion to Egress, is pushing on a panic bar to release the locking/latching hardware to allow a door to be opened. An example of a releasing motion in a single rotational direction is turning a lever-operated handle of a door lockset in either a clockwise direction or a counterclockwise direction, but not both directions, to unlock/unlatch the door. [101:A.7.2.1.5.3.2]

14.5.2.3.3
The releasing mechanism for new installations shall be capable of being operated with one hand and shall not require tight grasping, tight pinching, or twisting of the wrist to operate. [101:7.2.1.5.3.3]

14.5.2.3.4[1]4.5.2.10.3 *
Egress door assemblies from individual living units and guest rooms of residential occupancies shall be permitted to be provided with devices, including automatic latching devices, that require not more than one additional releasing operation, provided that such device is operable from the inside without the use of a key or tool and is mounted at a height not exceeding 48 in. (1220 mm) above the finished floor. [101:7.2.1.5.3.47.2.1.5.3.410.3]

A.14.5.2.3.4A.14.5.2.10.3
Examples of devices that, when used with a latch, can be arranged to require not more than one additional releasing operation include night latches, dead bolts, and security chains. [101:A.7.2.1.5.3.410.3]

14.5.2.3.5[1]4.5.2.10.4
Existing security devices permitted by 14.5.2.10.314.5.2.3.4 shall be permitted to have two additional releasing operations. [101:7.2.1.5.3.510.4]

14.5.2.3.6[1]4.5.2.10.5
Existing security devices permitted by 14.5.2.10.314.5.2.3.4, other than automatic latching devices, shall be located not more than 60 in. (1525 mm) above the finished floor. [101:7.2.1.5.3.610.5]

14.5.2.3.7[1]4.5.2.10.6
Two releasing operations shall be permitted for existing hardware on a door leaf serving an area having an occupant load not exceeding three, provided that releasing does not require simultaneous operations. [101:7.2.1.5.3.710.6]

14.5.2.3.8[1]4.5.2.10.7
Where permitted by Chapters 11 through 43 of NFPA 101, two releasing operations shall be permitted in existing educational occupancies in accordance with 15.2.2.4 of NFPA 101 and in existing day care occupancies in accordance with 17.2.2.6 of NFPA 101 for doors secured against unwanted entry. [101:7.2.1.5.3.810.7]

14.5.2.4
The requirements of 14.5.2.1 and 14.5.2.23 shall not apply where otherwise provided in Chapters 18 through 23 of NFPA 101. [101:7.2.1.5.4]

14.5.2.214.5.2.5 *
The requirement of 14.5.2.1 shall not apply to door leaves of listed fire door assemblies after exposure to elevated temperature in accordance with the listing, based on laboratory fire test procedures. [101:7.2.1.5.3.27.2.1.5.5]
Some fire door assemblies are listed for use with fire pins or fusible links that render the door leaf release inoperative upon exposure to elevated temperature during a fire. The door leaf release mechanism is made inoperative where conditions in the vicinity of the door opening become untenable for human occupancy, and such door opening no longer provides a viable egress path. [101: A.7.2.1.5.2A.7.2.1.5.5]

**Key-Operated Locks.**

Where permitted in Chapters 11 through 43 of NFPA 101, key operation shall be permitted, provided that the key cannot be removed when the door leaf is locked from the side from which egress is to be made. [101: 7.2.1.5.6.17]

Exterior door assemblies and interior door assemblies to an individual tenant space or to a single tenant space shall be permitted to have key-operated locks from the egress side, provided that all of the following criteria are met:

1. This alternative is permitted in Chapters 11 through 43 of NFPA 101 for the specific occupancy.
2. Doors remain unlocked when the building or space is occupied.
3. Doors are marked with a readily visible, durable sign in letters not less than 1 in. (25 mm) high on a contrasting background that reads as follows and is located on or adjacent to the door leaf: **THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED**, or **THIS DOOR TO REMAIN UNLOCKED WHEN THE BUILDING IS OCCUPIED**, as applicable.
4. The locking device is of a type that is readily distinguishable as locked.
5. A key is immediately available to any occupant inside the building when it is locked. [101: 7.2.1.5.5.17.2.1.5.6.2]

Where the entrance consists of an exterior vestibule, the locking arrangement should be permitted on the egress side of either the interior or exterior door of the vestibule. [101: A.7.2.1.5.6.25.1]

The alternative provisions of 14.5.2.5.1 shall be permitted to be revoked by the AHJ for cause. [101: 7.2.1.5.6.35.2]

**Stair Enclosure Re-entry.**

Every door assembly in a stair enclosure serving more than four stories, unless permitted by 14.5.2.8, shall meet one of the following conditions:

1. Re-entry from the stair enclosure to the interior of the building shall be provided.
An automatic release that is actuated with the initiation of the building fire alarm system shall be provided to unlock all stair enclosure door assemblies to allow re-entry that meets all of the following:

(a) The automatic release shall unlock all stair enclosure door assemblies to allow re-entry.
(b) The automatic release shall be actuated with the initiation of the building fire alarm system.
(c) Door hardware for new installations shall be listed in accordance with UL 294, Access Control System Units.

Selected re-entry shall be provided in accordance with 14.5.2.8.14.5.2.7.1.

A.14.5.2.8A.14.5.2.7

It is intended that the re-entry provisions apply only to enclosed exit stairs, not to outside stairs. This arrangement makes it possible to leave the stairway at such floor if the fire renders the lower part of the stair unusable during egress or if the occupants seek refuge on another floor. [101:A.7.2.1.5.78]

14.5.2.7.14.5.2.8.1

Door assemblies on stair enclosures shall be permitted to be equipped with hardware that prevents re-entry into the interior of the building, provided that the following criteria are met:

(1) There shall be not less than two levels where it is possible to leave the stair enclosure to access another exit.
(2) There shall be not more than four stories intervening between stories where it is possible to leave the stair enclosure to access another exit.
(3) Re-entry shall be possible on the top story or next-to-top story served by the stair enclosure, and such story shall allow access to another exit.
(4) Door assemblies allowing re-entry shall be identified as such on the stair side of the door leaf.
(5) Door assemblies not allowing re-entry shall be provided with a sign on the stair side indicating the location of the nearest door opening, in each direction of travel, that allows re-entry or exit.

[101:7.2.1.5.78.1]

14.5.2.7.214.5.2.8.2

The requirements of 14.5.2.814.5.2.7, except as provided in 14.5.2.8.314.5.2.7.3, shall not apply to the following:

(1) Existing installations in buildings that are not high-rise buildings as permitted in Chapters 11 through 43 of NFPA 101.
(2) Existing installations in high-rise buildings as permitted in Chapters 11 through 43 of NFPA 101 where the occupancy is within a building protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3.
(3) Existing approved stairwell re-entry installations as permitted by Chapters 11 through 43 of NFPA 101.
(4) Stair enclosures serving a building permitted to have a single exit in accordance with Chapters 11 through 43 of NFPA 101.
(5) Stair enclosures in health care occupancies where otherwise provided in Chapter 18 of NFPA 101.
Stair enclosures in detention and correctional occupancies where otherwise provided in Chapter 22 of NFPA 101.

14.5.2.7.3
When the provisions of 14.5.2.8.2 and 14.5.2.7.2 are used, signage on the stair door leaves shall be required as follows:

1. Door assemblies allowing re-entry shall be identified as such on the stair side of the door leaf.
2. Door assemblies not allowing re-entry shall be provided with a sign on the stair side indicating the location of the nearest door opening, in each direction of travel, that allows re-entry or exit.

14.5.2.8
If a stair enclosure allows access to the roof of the building, the door assembly to the roof either shall be kept locked preventing access to the roof or shall allow re-entry from the roof.

14.5.2.9
Where pairs of door leaves are required in a means of egress, one of the following criteria shall be met:

1. Each leaf of the pair shall be provided with a releasing device that does not depend on the release of one leaf before the other.
2. Approved automatic flush bolts shall be used and arranged such that both of the following criteria are met:
   a. The door leaf equipped with the automatic flush bolts shall have no doorknob or surface-mounted hardware on the egress side of the door.
   b. Unlatching of any leaf shall not require more than one operation.

14.5.2.10
On doors required to release all latching and all locking devices of the door leaf with not more than one releasing motion in accordance with 14.5.2.3.2, devices shall not be installed in connection with any door assembly on which panic hardware or fire exit hardware is required where such devices prevent or are intended to prevent the free use of the leaf for purposes of egress, unless otherwise provided in 14.5.3.

A.14.5.2.12
Examples of devices prohibited by this requirement include locks, padlocks, hasps, bars, chains, or combinations thereof.

A.14.5.3
None of the special locking arrangements addressed in 14.5.3 are intended to allow credentialed egress, request to exit, or similar provisions, where an occupant cannot leave the building without swiping a card through a reader. Where such an arrangement is desired to keep track of occupants, the swiping of cards needs to be procedural but not necessary for releasing the door lock or latch.
to be available at all times as required by this Code. Another option to free egress is the use of a 
delayed-egress electrically locking system. [101:A.7.2.1.6]

14.5.3.1 *Delayed-Egress Electrical Locking Systems.

A.14.5.3.1

Delayed-egress electrical locking systems function as the name suggests: these electrical locking systems 
delay egress through the door. However, 14.5.3.1.1(1) and 14.5.3.1.1(2) identify situations where the 
delay of these locking systems must be deactivated, facilitating immediate and unobstructed egress. 
Delayed-egress electrical locking systems are most commonly installed where there are concerns for 
internal security, such as theft from a store through required perimeter exits. Delayed-egress electrical 
locking systems might also be installed where occupants might benefit by being protected from their 
actions. [101:A.7.2.1.6.1]

14.5.3.1.1

Approved, delayed-egress electrical locking systems shall be permitted to be installed on door 
assemblies serving low- and ordinary-hazard contents in buildings protected throughout by an 
approved, supervised automatic fire detection system in accordance with Section -13.7 or an approved, 
supervised automatic sprinkler system in accordance with Section -13.3, and where permitted in 
Chapters 11 through 43 of NFPA 101, provided that the following criteria are met:

1. The delay of the delayed-egress electrical locking system shall deactivate allowing unobstructed 
egress upon actuation of one of the following:
   (a) Approved, supervised automatic sprinkler system in accordance with Section 13.3
   (b) Not more than one heat detector of an approved, supervised automatic fire detection 
system in accordance with Section 13.7
   (c) Not more than two smoke detectors of an approved, supervised automatic fire 
detection system in accordance with Section 13.7

2. The delay of the delayed-egress electrical locking system shall deactivate allowing unobstructed 
egress upon loss of power controlling the lock or locking mechanism.

3.* An irreversible process shall release the electrical lock in the direction of egress within 
15 seconds, or 30 seconds where approved by the AHJ, upon application of a force to the 
release device required in 14.5.2.10-14.5.2.3 under all of the following conditions:
   (a) The force shall not be required to exceed 15 lbf (67 N).
   (b) The force shall not be required to be continuously applied for more than 3 seconds.
   (c) The initiation of the release process shall activate an audible signal in the vicinity of the 
door opening.
   (d) Once the electrical lock has been released by the application of force to the releasing 
device, rearming the delay electronics shall be by manual means only.

4.* A readily visible, durable sign that conforms to the visual characters requirements of ICC/ANSI 
A117.1, Accessible and Usable Buildings and Facilities, shall be located on the door leaf adjacent 
to the release device in the direction of egress, and shall read as follows:
   (a) PUSH UNTIL ALARM SOUNDS, DOOR CAN BE OPENED IN 15 SECONDS, for doors that 
swing in the direction of egress travel
   (b) PULL UNTIL ALARM SOUNDS, DOOR CAN BE OPENED IN 15 SECONDS, for doors that 
swing against the direction of egress travel
(5) The egress side of doors equipped with delayed-egress electrical locking system shall be provided with emergency lighting in accordance with Section 7.9 of NFPA 101.

(6) Hardware for new installations shall be listed in accordance with UL 294, Access Control System Units.

[A.7.2.1.6.1.1]

A.14.5.3.1.1(3)

It is not the intent to require a direct physical or electrical connection between the door release device and the lock. It is the intent to allow door movement initiated by operating the door release device required in 14.5.2.10 - 14.5.2.3 as one option to initiate the irreversible process. [A.7.2.1.6.1.1(3)]

Delayed-egress electrical locking systems commonly employ a mechanical latch and/or lock in addition to an electrical lock. The use of a mechanical latch/lock in addition to an electrical lock such as a magnetic lock allows a door to be mechanically locked preventing uncontrolled ingress should the electrical lock be de-energized as in a power failure. [A.7.2.1.6.1.1(3)]

Several factors need to be considered in approving an increase in delay time from 15 seconds to 30 seconds. Some of those factors include occupancy, occupant density, ceiling height, fire hazards present, fire protection features provided, and the location of the delayed-egress locks. An example of a location where the increase on delay time might not be approved is at an exit stair discharge door. [A.7.2.1.6.1.1(3)]

14.5.3.1.2

The provisions of 14.5.3.2 for sensor-release of electrical locking systems and 14.5.3.3, for door hardware release of electrically locked egress door assemblies shall not apply to door assemblies with delayed-egress electrical locking systems. [A.7.2.1.6.1.2]

14.5.3.2 *Sensor-Release of Electrical Locking Systems.

A.14.5.3.2

Doors with a sensor-release electrical locking system are equipped with an electrical locking system that is released by a sensor activated by the normal motions of an occupant egressing through that door. The activation of the sensor to cause the electrical lock to release is usually by passive action by the occupant, such as walking to the door. A manual release device, such as a push-button switch that directly interrupts the power to the electrical lock, is required by item (3) as a backup. With most sensor-release electrical locking systems, the occupant might not notice the door is electrically locked in the direction of egress. Doors equipped with these locking systems provide unobstructed, immediate egress. [A.7.2.1.6.2]

These provisions were previously titled “Access-Controlled Egress Door Assemblies” as these doors typically have some type of access control system, such as a key pad, card scanner, or fob scanner controlling access (ingress) into the building or space. Because access control systems can be installed on essentially any door, the previous title resulted in differing interpretations, applications, and
enforcement of permitted locking systems, and they were retitled in the 2018 edition of the Code. [101:A.7.2.1.6.2]

### 14.5.3.2.1
Where permitted in Chapters 11 through 43 of NFPA 101, door assemblies in the means of egress shall be permitted to be equipped with sensor-release electrical locking system hardware provided that all of the following criteria are met:

1. A sensor shall be provided on the egress side, arranged to electrically unlock the door leaf in the direction of egress upon detection of an approaching occupant.
2. Door leaves shall automatically electrically unlock in the direction of egress upon loss of power to the sensor or to the part of the locking system that electrically locks the door leaves.
3. Door locks shall be arranged to electrically unlock in the direction of egress from a manual release device complying with all of the following criteria:
   a. The manual release device shall be located on the egress side, 40 in. to 48 in. (1015 mm to 1220 mm) vertically above the floor, and within 60 in. (1525 mm) of the secured door openings, except as otherwise permitted by 14.5.3.2.1(3)(c).
   b. The requirement of 14.5.3.2.1(3)(a) to locate the manual release device within 60 in. (1525 mm) of the secured door opening shall not apply to previously approved existing installations.
   c. The manual release device shall be readily accessible and clearly identified by a sign that reads as follows: PUSH TO EXIT.
   d. When operated, the manual release device shall result in direct interruption of power to the electrical lock — independent of the locking system electronics — and the lock shall remain unlocked for not less than 30 seconds.
4. Activation of the building fire-protective signaling system, if provided, shall automatically electrically unlock the door leaves in the direction of egress, and the door leaves shall remain electrically unlocked until the fire-protective signaling system has been manually reset.
5. The activation of manual fire alarm boxes that activate the building fire-protective signaling system specified in 14.5.3.2.1(4) shall not be required to unlock the door leaves.
6. Activation of the building automatic sprinkler or fire detection system, if provided, shall automatically electrically unlock the door leaves in the direction of egress, and the door leaves shall remain electrically unlocked until the fire-protective signaling system has been manually reset.
7. The egress side of sensor-release electrically locked egress doors, other than existing sensor-release electrically locked egress doors, shall be provided with emergency lighting in accordance with Section 14.13.
8. Hardware for new installations shall be listed in accordance with UL 294, Access Control System Units. [101:A.7.2.1.6.2.1]

### 14.5.3.2.2
The provisions of 14.5.3.1 for delayed-egress electrical locking systems and 14.5.3.3 for door hardware release of electrically locked egress door assemblies shall not apply to door assemblies with sensor-release of electrical locking systems. [101:A.7.2.1.6.2.2]
14.5.3.3 Door Hardware Release of Electrically Locked Egress Door Assemblies.

14.5.3.3.1 Door assemblies in the means of egress shall be permitted to be equipped with approved electrical locking systems released by the operation of door hardware provided that all of the following conditions are met:

1. The hardware for egress-side occupant release of the electrical lock is affixed to the door leaf.
2. The hardware has an obvious method of operation that is readily operated in the direction of egress under all lighting conditions.
3. The hardware is capable of being operated with one hand in the direction of egress.
4. Operation of the hardware directly and immediately interrupts the power supply to the electric lock and unlocks the door assembly in the direction of egress.
5. Loss of power to the listed releasing hardware automatically electrically unlocks the door assembly in the direction of egress.
6. Hardware for new installations is listed in accordance with UL 294, Access Control System Units.

A.14.5.2.5.2A.14.5.3.1(5)
It is critical that the electrical lock be arranged to release upon loss of power to the releasing hardware to ensure occupants can egress in the event of a power failure. 

14.5.3.4 Elevator Lobby Exit Access Door Assemblies Locking.

A.14.5.3.3(14)-A.14.5.3.4
The electrical locking provisions of 14.5.3.4 for elevator lobby exit access door assemblies are similar to, but different from, the electrical locking systems of 14.5.3.1, 14.5.3.2, and 14.5.3.3. 

On doors to tenant spaces from the elevator lobby, it is not the intent to prohibit elevator lobby doors from being equipped with card-access systems, such as card readers controlling access to the gaining access, for example, to tenant spaces, provided that the door leading from the elevator lobby is not in the path to the exit access required by 14.9.1.6.1. 

It is the acceptable to use a sensor-release of electrical locking systems described in 14.5.3.2 that is prohibited from being installed on the same door as the lock addressed by 14.5.3.3 from a tenant space into the elevator lobby with the sensor on the tenant (egress)side of the door to allow free access to the elevator lobby. 

14.5.3.4.1 Where permitted in Chapters 11 through 43 of NFPA 101, door assemblies separating the elevator lobby from the exit access required by 14.9.1.6.1 shall be permitted to be electrically locked, provided that all the following criteria are met:
The electrical locking hardware is listed in accordance with UL 294, *Access Control System Units*.

The building is protected throughout by a fire alarm system in accordance with Section 13.7.

Waterflow in the sprinkler system required by 14.5.3.3(3) 14.5.3.4.1 is arranged to initiate the building fire alarm system.

The building is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3.

Detection of smoke by the detection system required by 14.5.3.4.1 14.5.3.3(5) is arranged to initiate the building fire alarm system and notify building occupants.

Loss of power to the elevator lobby electrical lock system unlocks the electrical locks on the elevator lobby door assemblies.

Once unlocked, the elevator lobby door assemblies remain electrically unlocked until the building fire alarm system has been manually reset.

Where the elevator lobby door assemblies remain mechanically latched after being electrically unlocked, latch-releasing hardware in accordance with 14.5.2.10 14.5.2.3 is affixed to the door leaves.

A two-way communication system is provided for communication between the elevator lobby and a central control point that is constantly staffed.

The central control point staff required by 14.5.3.3(11) 14.5.3.4.1 is capable, trained, and authorized to provide emergency assistance.

The provisions of 14.5.3.1 for delayed-egress electrical locking systems are not applied to the elevator lobby door assemblies.

The provisions of 14.5.3.2 for sensor-release of electrical locking systems are not applied to the elevator lobby door assemblies.

14.5.3.4.2

Elevator lobby exit access doors equipped with electrical locking systems shall not be required to comply with 14.5.3.4.1, 14.5.3.4.2, or 14.5.3.4.3. [101:7.2.1.6.4.2]

14.5.3.5A 14.5.3.5 *Panic Hardware and Fire Exit Hardware.*

A.14.5.3.4A 14.5.3.5

See 14.9.2.1.2 and 14.9.2.2.2 for door unlatching requirements for working space about electrical equipment. [101:A.7.2.1.7]

14.5.3.5.1A 14.5.3.5.4 Where a side-hinged, or a pivoted-swinging door assembly, or a balanced door assembly is required to be equipped with panic or fire exit hardware, such hardware shall meet all of the following criteria:

1. It shall consist of a cross bar or a push pad, with the length of the actuating portion of the cross bar or push pad not less than one-half of the width of the door leaf measured from the latch stile unless otherwise required by 14.5.3.5.2.
(2) It shall be mounted as follows:
   (a) New installations shall be not less than 34 in. (865 mm), and not more than 48 in. (1220 mm), above the floor.
   (b) Existing installations shall be not less than 30 in. (760 mm), and not more than 48 in. (1220 mm), above the floor.

(3) It shall be constructed so that a horizontal force not to exceed 15 lbf (66.7 N) actuates the cross bar or push pad and latches.

[101:7.2.1.7.1]

**14.5.3.4.2 14.5.3.5.2**
Where panic or fire exit hardware is installed on a balanced door assembly or pivoted-swinging door assembly, the panic or fire exit hardware shall be of the push-pad type, and the pad shall extend approximately one-half the width of the door leaf, measured from the latch stile. [101:7.2.1.7.2]

**14.5.3.4.3 14.5.3.5.3**
Only approved fire exit hardware shall be used on fire-protection-rated door assemblies. New panic hardware and new fire exit hardware shall comply with UL 305, Panic Hardware, and ANSI/BHMA A156.3, Exit Devices and ANSI/BHMA A156.3. [101:7.2.1.7.32]

**A.14.5.3.4.32 14.5.3.5.3**
The presence of fire exit hardware on a door does not imply the door is required to be a fire protection-rated door. [101:A.7.2.1.7.32]

**14.5.3.5.4 14.5.3.4.43**
Required panic hardware and fire exit hardware, in other than detention and correctional occupancies as otherwise provided in Chapters 22 and 23 of NFPA 101, shall not be equipped with any locking device, set screw, or other arrangement that prevents the release of the latch when pressure is applied to the releasing device. [101:7.2.1.7.43]

**14.5.3.5.5 14.5.3.4.54**
Devices that hold the latch in the retracted position shall be prohibited on fire exit hardware, unless such devices are listed and approved for such a purpose. [101:7.2.1.7.54]

**14.5.4.2**
In any building of low- or ordinary-hazard contents, as defined in 3.3.152.2 and 3.3.152.3, or where approved by the AHJ, door leaves shall be permitted to be automatic-closing, provided that all of the following criteria are met:

(1) Upon release of the hold-open mechanism, the leaf becomes self-closing.
(2) The release device is designed so that the leaf instantly releases manually and, upon release, becomes self-closing, or the leaf can be readily closed.
(3) The automatic releasing mechanism or medium is activated by the operation of approved smoke detectors in-stalled in accordance with the requirements for smoke detectors for door leaf release service in NFPA 72.
Upon loss of power to the hold-open device, the hold-open mechanism is released and the door leaf becomes self-closing.

The release by means of smoke detection of one door leaf in a stair enclosure results in closing all door leaves serving that stair. [101:7.2.1.8.2]

14.5.4.3
The elevator car doors, and the associated hoistway enclosure doors, at the floor level designated for recall in accordance with the requirements of 11.3.1 shall be permitted to remain open during Phase I Emergency Recall Operation. [101:7.2.1.8.3]

A.14.5.5
Special-purpose horizontally sliding accordion or folding door assemblies installed in accordance with 7.2.1.134 of NFPA 101:14.5.9 should not be considered powered doors subject to the provisions of 14.5.5. [101:A.7.2.1.9]

Powered doors are divided into two categories — power-assisted or low-energy power-operated doors and power-operated doors. Power-assisted doors that conform to ANSI/BHMA A156.19, Power Assist and Low Energy Power Operated Doors, use limited power to operate the door. They require fewer safeguards as compared to full power-operated doors. These door operators are for swinging, sliding, or folding doors only. Power-assisted and low-energy power-operated doors require fewer safeguards as compared to power-operated doors. Power-operated doors that conform to ANSI/BHMA A156.10, Power Operated Pedestrian Doors, require more power to operate the door and require additional safeguards to provide protection against personal injury. Power-operated doors can be swinging, sliding, or folding doors. [101:A.7.2.1.9]

14.5.5.1 General.
Where means of egress door leaves are operated by power by any automatic mechanism upon the approach of a person or are provided with power-assisted manual operation, the design shall be such that, in the event of power failure, the leaves open manually to allow egress travel or close when necessary to safeguard the means of egress. [101:7.2.1.9.1]

14.5.5.1.5
The door assembly shall be designed and installed so that, when a force is applied to the door leaf on the egress side from which egress is made, it shall be capable of swinging from any position to provide full use of the required width of the opening in which it is installed. (See 14.5.1.) [101:7.2.1.9.1.5]

14.5.5.1.10
Door assemblies complying with 14.5.10-9 shall be permitted to be used. [101:7.2.1.9.1.10]

14.5.5.1.11
The requirements of 14.5.5.1.1 through 14.5.5.1.10 shall not apply in detention and correctional occupancies where otherwise provided in Chapters 22 and 23 of NFPA 101. [101:7.2.1.9.1.11]
14.5.5.2 Self-Closing or Self-Latching Door Leaf Operation.

Where door leaves are required to be self-closing or self-latching and are operated by power upon the approach of a person, by any automatic device, or are provided with power-assisted manual operation, they shall be permitted in the means of egress where they meet the following criteria:

1. The door leaves can be opened manually in accordance with 14.5.5.1 to allow egress travel in the event of power failure.
2. New door leaves remain in the closed position, unless actuated or opened manually.
3. When actuated, new door leaves remain open for not more than 30 seconds.
4. Door leaves held open for any period of time close — and the power-assist mechanism ceases to function — upon operation of approved smoke detectors installed in such a way as to detect smoke on either side of the door opening in accordance with the provisions of NFPA 72.
5. Door leaves required to be self-latching are either self-latching or become self-latching upon operation of approved smoke detectors per 14.5.5.2(4).

101:7.2.1.9.2

14.5.6.1

Revolving door assemblies, whether used or not used in the means of egress, shall comply with all of the following:

1. New revolving doors shall comply with ANSI/BHMA A156.27, Power and Manual Operated Revolving Pedestrian Doors, and shall be installed in accordance with the manufacturer’s installation instructions.
2. Revolving door wings shall be capable of book-fold or breakout for egress in accordance with ANSI/BHMA A156.27, unless they are existing revolving doors approved by the authority having jurisdiction AHJ.
3. When revolving door wings are collapsed into the book-fold position, the parallel egress paths formed shall provide an aggregate width of 36 in. (915 mm), unless they are approved existing revolving door assemblies.
4. Revolving door assemblies shall not be used within 10 ft (3050 mm) of the foot or the top of stairs or escalators.
5. A dispersal area acceptable to the authority having jurisdiction shall be located between stairs or escalators and the revolving door assembly.
6. The revolutions per minute (rpm) of door wings shall not exceed the following:
   a. The values in Table 14.5.6.1 for existing revolving doors.
   b. The values in ANSI/BHMA A156.27 for new revolving doors.
7. Each revolving door assembly shall have a conforming side-hinged swinging door assembly in the same wall as the revolving door within 10 ft (3050 mm) of the revolving door, unless one of the following conditions applies:
   a. Revolving door assemblies shall be permitted without adjacent swinging door assemblies, as required by 14.5.6.1(6), in street floor elevator lobbies, provided that no stairways or door openings from other parts of the building discharge through the lobby and the lobby has no occupancy other than as a means of travel between the elevators and street.
The requirement of 14.5.6.1(6) shall not apply to existing revolving door assemblies where the number of revolving door assemblies does not exceed the number of swinging door assemblies within 20 ft (6100 mm) of the revolving door assembly.

8Table 14.5.6.1 Existing Revolving Door Assembly Maximum Speed

<table>
<thead>
<tr>
<th>Inside Diameter (ft/in.)</th>
<th>Power-Driven Speed Control (rpm)</th>
<th>Manual Speed Control (rpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft</td>
<td>mm</td>
<td>Ft</td>
</tr>
<tr>
<td>6 ft 6 in.</td>
<td>1980</td>
<td>11</td>
</tr>
<tr>
<td>7 ft</td>
<td>2135</td>
<td>10</td>
</tr>
<tr>
<td>7 ft 6 in.</td>
<td>2285</td>
<td>9</td>
</tr>
<tr>
<td>8 ft</td>
<td>2440</td>
<td>9</td>
</tr>
<tr>
<td>8 ft 6 in.</td>
<td>2590</td>
<td>8</td>
</tr>
<tr>
<td>9 ft</td>
<td>2745</td>
<td>8</td>
</tr>
<tr>
<td>9 ft 6 in.</td>
<td>2895</td>
<td>7</td>
</tr>
<tr>
<td>10 ft</td>
<td>3050</td>
<td>7</td>
</tr>
</tbody>
</table>

14.5.7.1.2
Where turnstiles are approved by the authority having jurisdiction (AHJ) and permitted in Chapters 11 through 43 of NFPA 101, each turnstile shall be credited for a capacity of 50 persons, provided that such turnstiles meet all of the following criteria:

(1) They freewheel in the egress direction when primary power is lost, and freewheel in the direction of egress travel upon manual release by an employee assigned in the area.

(2) They are not given credit for more than 50 percent of the required egress width.

(3) They are not in excess of 39 in. (990 mm) in height and have a clear width of not less than 16\(\frac{1}{2}\) in. (420 mm).

14.5.7.1.3 *
Security access turnstiles that impede travel in the direction of egress utilizing a physical barrier shall be permitted to be considered as a component of the means of egress, where permitted in Chapters 11 through 43 of NFPA 101, provided that all the following criteria are met:

(1) The building is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 14.813.3.

(2) Each security access turnstile lane configuration has a minimum clear passage width of 22 in. (560 mm).

(3) Any security access turnstile lane configuration providing a clear passage width of less than 32 in. (810 mm) shall be given an egress capacity of 50 persons.

(4) Any security access turnstile lane configuration providing a clear passage width of 32 in. (810 mm) or more shall be given an egress capacity as calculated in accordance with Section 14.5.6.14.8.

(5) Each secured physical barrier shall automatically retract or swing to an unobstructed open position in the direction of egress, under each of the following conditions:
(a) Upon loss of power to the turnstile or any part of the access control system that secures the physical barrier

(b) Upon actuation of a readily accessible and clearly identified manual release device that results in direct interruption of power to each secured physical barrier, remains in the open position for not less than 30 seconds, and is positioned at one of the following locations:
   i. The manual release device is located on the egress side of each security access turnstile lane.
   ii. The manual release device is located at an approved location where it can be actuated by an employee assigned to the area.

(c) Upon actuation of the building fire-protective signaling system, if provided, and for which the following apply:
   i. The physical barrier remains in the open position until the fire-protective signaling system is manually reset.
   ii. The actuation of manual fire alarm boxes that actuate the building fire-protective signaling system is not required to meet the requirements specified in 14.5.7.1.3(5)(c).

(d) Upon actuation of the building automatic sprinkler or fire detection system, and for which the physical barrier remains in the open position until the fire-protective signaling system is manually reset

[101:7.2.1.11.1.3]

14.5.9 Balanced Door Assemblies.
If panic hardware is in stalled on balanced door leaves, the panic hardware shall be of the push-pad type, and the pad shall not extend more than approximately one-half the width of the door leaf, measured from the latch stile. (See 14.5.3.4.1(1)). [101:7.2.1.13]

14.5.910 Special-Purpose Horizontally Sliding Accordion or Folding Door Assemblies.
Special-purpose horizontally sliding accordion or folding door assemblies shall be permitted in means of egress, provided that all of the following criteria are met:

(1) The door leaf is readily operable from either the egress side without special knowledge or effort.
(2) The force that, when applied to the operating device in the direction of egress, is required to operate the door leaf is not more than 15 lbf (67 N).
(3) The force required to operate the door leaf in the direction of travel is not more than 30 lbf (133 N) to set the leaf door in motion and is not more than 15 lbf (67 N) to close the leaf or open it to the minimum required width.
(4) The door leaf is operable using a force of not more than 50 lbf (222 N) when a force of 250 lbf (1100 N) is applied perpendicularly to the leaf door adjacent to the operating device, unless the door opening is an existing special-purpose horizontally sliding accordion or folding exit access door assembly serving an area with an occupant load of fewer than 50.
(5) The door assembly complies with the fire protection rating, if required, and, where rated, is self-closing or automatic-closing by means of smoke detection in accordance with 14.5.4 and is installed in accordance with NFPA 80.

[101:7.2.1.134]
14.5.101 Inspection of Door Openings.

14.5.101.1 *
Where required by Chapters 11 through 43 of NFPA 101, the following door assemblies shall be inspected and tested not less than annually in accordance with 14.5.101.2 through 14.5.101.7:

1. Door leaves equipped with panic hardware or fire exit hardware in accordance with 14.5.3.4
2. Door assemblies in exit enclosures
3. Door hardware-release of electrically locked egress door assemblies
4. Door assemblies with special locking arrangements subject to 14.5.3.3

A.14.5.101.1
Door assemblies within the required means of egress (e.g., door assemblies that discharge from exit enclosures) require a higher level of care and maintenance throughout the life of their installations to ensure they perform as intended by the Code. Annual inspection and functional testing of these door assemblies is necessary to verify that they are maintained in proper working condition. Panic hardware and fire exit hardware devices are specifically required to be used in assembly and educational occupancies. However, door leaves that are equipped with panic hardware or fire exit hardware, in areas not specifically required by the Code (e.g., stairwell entry doors and double-egress cross-corridor door assemblies not serving an assembly occupancy), should be subject to annual inspection and functional testing to ensure that the operating hardware functions correctly in accordance with 14.5.3.4, since the presence of panic hardware and fire exit hardware implies it is required by the Code.

Additionally, door assemblies that are door hardware-release of electrically locked egress door assemblies in accordance with 14.5.2.5 and door assemblies that are equipped with special locking arrangements in accordance with 14.5.3.3 are outfitted with electrified hardware and access control devices that are susceptible to wear and abuse. Consequently, these door assemblies need to be inspected and tested on an annual basis, regardless of the occupant load being served.

In cases where the authority having jurisdiction determines there is a distinct hazard to building occupant safety, the inspection requirements of 7.2.1.15 should be applied to other exit access, exit, and exit discharge door assemblies.

14.5.101.2 *
The inspection and testing interval for fire-rated and nonrated door assemblies shall be permitted to exceed 12 months under a written performance-based program.

A.14.5.101.2
See NFPA 80, Annex J, for information pertaining to performance-based inspection, testing, and maintenance of door assemblies.
14.5.101.2.1
Goals established under a performance-based program shall provide assurance that the door assembly will perform its intended function. [101:7.2.1.145.2.1]

14.5.101.2.2
Technical justification for inspection, testing, and maintenance intervals shall be documented. [101:7.2.1.145.2.2]

14.5.101.2.3
The performance-based option shall include historical data. [101:7.2.1.145.2.3]

14.5.101.3
A written record of the inspections and testing shall be signed and kept for inspection by the authority having jurisdiction. [101:7.2.1.145.3]

14.5.101.4
Functional testing of door assemblies shall be performed by individuals who can demonstrate knowledge and understanding of the operating components of the type of door being subjected to testing. [101:7.2.1.145.4]

14.5.101.5
Door assemblies shall be visually inspected from both sides of the opening to assess the overall condition of the assembly. [101:7.2.1.145.5]

14.5.101.6
As a minimum, the following items shall be verified:

1. Floor space on both sides of the openings is clear of obstructions, and door leaves open fully and close freely.
2. Forces required to set door leaves in motion and move to the fully open position do not exceed the requirements in 14.5.1.5.
3. Latching and locking devices comply with 14.5.2.
4. Releasing hardware devices are installed in accordance with 14.5.2.10.114.5.2.3.1.
5. Door leaves of paired openings are installed in accordance with 14.5.2.114.5.2.9.
6. Door closers are adjusted properly to control the closing speed of door leaves in accordance with accessibility requirements.
7. Projection of door leaves into the path of egress does not exceed the encroachment permitted by 14.5.1.3.
8. Powered door openings operate in accordance with 14.5.5.
9. Signage required by 14.5.1.1(3), 14.5.2.514.5.2.6, 14.5.3, and 14.5.5 is intact and legible.
10. Door openings with special locking arrangements function in accordance with 14.5.3.
11. Security devices that impede egress are not installed on openings, as required by 14.5.2.1214.5.2.10.
12. Where required by 7.2.2.5.5.7 of NFPA 101, door hardware marking is present and intact.
(13) Emergency lighting on sensor-release of electrical locking systems and doors equipped with delayed-egress electrical locking systems is present in accordance with Section 14.13.

14.5.104.7 *

Door openings not in proper operating condition shall be repaired or replaced without delay.

A.14.5.104.7

Performing corrective action work on door assemblies frequently requires ordering replacement components that might take time to produce, ship, and install. Consideration of the time it takes to procure and install components should be included in the timeline for restoring the door assemblies to normal working condition. [101:A.7.2.1.145.7]

A.14.6.2

The purpose of this provision is to protect the exterior wall of a stairway from fires in other portions of the building. If the exterior wall of the stair is flush with the building exterior wall, the fire would need to travel around 180 degrees in order to impact the stair. This has not been a problem in existing buildings, so no protection is required. However, if the angle of exposure is less than 180 degrees, protection of either the stair wall or building wall is required. [101:A.7.2.2.5.2]

Figure A.14.6.2(a), Figure A.14.6.2(b), and Figure A.14.6.2(c) illustrate the requirement, assuming nonrated glass on the exterior wall of the stair is used. [101:A.7.2.2.5.2]

Figure A.14.6.2(a) Stairway with Nonrated Exterior Wall in Same Plane as Building Exterior Wall. [101:Figure A.7.2.2.5.2(a)]

***INSERT FIGURE***

Figure A.14.6.2(b) Stairway with Unprotected Exterior Perimeter Protruding Past Building Exterior Wall. [101:Figure A.7.2.2.5.2(b)]

***INSERT FIGURE***

Figure A.14.6.2(c) Stairway with Nonrated Exterior Wall Exposed by Adjacent Exterior Wall of Building. [101:Figure A.7.2.2.5.2(c)]

***INSERT FIGURE***

A.14.7

An exit passageway serves as a horizontal means of exit travel that is protected from fire in a manner similar to an enclosed interior exit stair. Where it is desired to offset exit stairs in a multistory building, an exit passageway can be used to preserve the continuity of the protected exit by connecting the bottom of one stair to the top of the stair that continues to the street floor. Probably the most important use of an exit passageway is to satisfy the requirement that at least 50 percent of the exit stairs discharge directly outside from multistory buildings (see 7.7.2 of NFPA 101). Thus, if it is impractical to locate the stair on an exterior wall, an exit passageway can be connected to the bottom of
the stair to convey the occupants safely to an outside exit door. In buildings of extremely large area, such as shopping mall concourses and some factories, the exit passageway can be used to advantage where the travel distance to reach an exit would otherwise be excessive. [101:A.7.2.6]

14.7.4.1
The width of an exit passageway shall be sized to accommodate the aggregate required capacity of all exits that discharge through it, unless one of the following conditions applies:

1. Where an exit passageway serves occupants of the level of exit discharge as well as other stories, the capacity shall not be required to be aggregated.

2. As provided in Chapters 36 and 37 of NFPA 101, an exit passageway in a mall structure shall be permitted to accommodate occupant loads independently from the mall concourse and the tenant spaces. (See 36.2.2.7.2 and 37.2.2.7.2 of NFPA 101.)

14.8.1.1.1
The total capacity of the means of egress for any story, balcony, tier, or other occupied space shall be sufficient for the occupant load thereof unless one of the following conditions exists:

1. The authority having jurisdiction (AHJ) shall be permitted to establish the occupant load as the number of persons for which existing means of egress is adequate, provided that measures are established to prevent occupancy by a greater number of persons.

2. The egress capacity shall have been previously approved as being adequate.

14.8.1.2 *Occupant Load Factor.
The occupant load in any building or portion thereof shall be not less than the number of persons determined by dividing the floor area assigned to that use by the occupant load factor for that use as specified in Table 14.8.1.2, Figure 14.8.1.2(a), and Figure 14.8.1.2(b). Where both gross and net area figures are given for the same occupancy, calculations shall be made by applying the gross area figure to the gross area of the portion of the building devoted to the use for which the gross area figure is specified and by applying the net area figure to the net area of the portion of the building devoted to the use for which the net area figure is specified. [101:7.3.1.2]

### Table 14.8.1.2 Occupant Load Factor

<table>
<thead>
<tr>
<th>Use</th>
<th>(ft²/person)ᵃ</th>
<th>(m²/person)ᵇ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Concentrated use, without fixed seating</td>
<td>7 net</td>
<td>0.65 net</td>
</tr>
<tr>
<td>Less concentrated use, without fixed seating</td>
<td>15 net</td>
<td>1.4 net</td>
</tr>
<tr>
<td>Bench-type seating</td>
<td>1 person/18 linear in.</td>
<td>1 person/455 linear mm</td>
</tr>
<tr>
<td>Fixed seating</td>
<td>Use number of fixed seats</td>
<td>Use number of fixed seats</td>
</tr>
<tr>
<td>Waiting spaces</td>
<td>See 12.1.7.2 and 13.1.7.2 of NFPA 101</td>
<td>See 12.1.7.2 and 13.1.7.2 of NFPA 101</td>
</tr>
<tr>
<td>Area Type</td>
<td>Area</td>
<td>Height</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>Kitchens</td>
<td>100</td>
<td>9.3</td>
</tr>
<tr>
<td>Library stack areas</td>
<td>100</td>
<td>9.3</td>
</tr>
<tr>
<td>Library reading rooms</td>
<td>50 net</td>
<td>4.6 net</td>
</tr>
<tr>
<td>Swimming pools</td>
<td>50 (water surface)</td>
<td>4.6 (water surface)</td>
</tr>
<tr>
<td>Swimming pool decks</td>
<td>30</td>
<td>2.8</td>
</tr>
<tr>
<td>Exercise rooms with equipment</td>
<td>50</td>
<td>4.6</td>
</tr>
<tr>
<td>Exercise rooms without equipment</td>
<td>15</td>
<td>1.4</td>
</tr>
<tr>
<td>Stages</td>
<td>15 net</td>
<td>1.4 net</td>
</tr>
<tr>
<td>Lighting and access catwalks, galleries, gridirons</td>
<td>100 net</td>
<td>9.3 net</td>
</tr>
<tr>
<td>Casinos and similar gaming areas</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Skating rinks</td>
<td>50</td>
<td>4.6</td>
</tr>
<tr>
<td>Business Use (other than below)</td>
<td>100-150</td>
<td>9.3-14</td>
</tr>
<tr>
<td>Concentrated Business Use&lt;sup&gt;a&lt;/sup&gt;</td>
<td>50</td>
<td>4.6</td>
</tr>
<tr>
<td>Airport control tower observation levels</td>
<td>40</td>
<td>3.7</td>
</tr>
<tr>
<td>Collaboration rooms/spaces ≤450 ft&lt;sup&gt;2&lt;/sup&gt; (41.8 m&lt;sup&gt;2&lt;/sup&gt;) in area&lt;sup&gt;b&lt;/sup&gt;</td>
<td>30</td>
<td>2.8</td>
</tr>
<tr>
<td>Collaboration rooms/spaces &gt;450 ft&lt;sup&gt;2&lt;/sup&gt; (41.8 m&lt;sup&gt;2&lt;/sup&gt;) in area&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15</td>
<td>1.4</td>
</tr>
<tr>
<td>Day-Care Use</td>
<td>35 net</td>
<td>3.3 net</td>
</tr>
<tr>
<td>Detention and Correctional Use</td>
<td>120</td>
<td>11.1</td>
</tr>
<tr>
<td>Educational Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Classrooms</td>
<td>20 net</td>
<td>1.9 net</td>
</tr>
<tr>
<td>Shops, laboratories, vocational rooms</td>
<td>50 net</td>
<td>4.6 net</td>
</tr>
<tr>
<td>Health Care Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inpatient treatment departments</td>
<td>240</td>
<td>22.3</td>
</tr>
<tr>
<td>Sleeping departments</td>
<td>120</td>
<td>11.1</td>
</tr>
<tr>
<td>Ambulatory health care</td>
<td>150</td>
<td>13.4</td>
</tr>
<tr>
<td>Industrial Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>General and high hazard industrial</td>
<td>100</td>
<td>9.3</td>
</tr>
<tr>
<td>Special-purpose industrial</td>
<td>NAMP</td>
<td>NAMP</td>
</tr>
<tr>
<td>Mercantile Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sales area on street floor&lt;sup&gt;c&lt;/sup&gt;d</td>
<td>30</td>
<td>2.8</td>
</tr>
<tr>
<td>Sales area on two or more street floors&lt;sup&gt;d&lt;/sup&gt;</td>
<td>40</td>
<td>3.7</td>
</tr>
<tr>
<td>Sales area on floor below street floor&lt;sup&gt;e&lt;/sup&gt;d</td>
<td>30</td>
<td>2.8</td>
</tr>
<tr>
<td>Sales area on floors above street floor&lt;sup&gt;f&lt;/sup&gt;d</td>
<td>60</td>
<td>5.6</td>
</tr>
<tr>
<td>Floors or portions of floors used only for offices</td>
<td>See business use.</td>
<td>See business use.</td>
</tr>
<tr>
<td>Floors or portions of floors used only for storage, receiving, and shipping, and not open to general public</td>
<td>300</td>
<td>27.9</td>
</tr>
<tr>
<td>Mall structures&lt;sup&gt;g&lt;/sup&gt;structures&lt;sup&gt;h&lt;/sup&gt;</td>
<td>Per factors applicable to use of space&lt;sup&gt;space&lt;/sup&gt;e</td>
<td></td>
</tr>
<tr>
<td>Residential Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hotels and dormitories</td>
<td>200</td>
<td>18.6</td>
</tr>
<tr>
<td>Apartment buildings</td>
<td>200</td>
<td>18.6</td>
</tr>
<tr>
<td>Board and care, large</td>
<td>200</td>
<td>18.6</td>
</tr>
<tr>
<td>Storage Use</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>In storage occupancies</td>
<td>NAMP</td>
<td>NAMP</td>
</tr>
<tr>
<td>------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>In mercantile occupancies</td>
<td>300</td>
<td>27.9</td>
</tr>
<tr>
<td>In other than storage and mercantile occupancies</td>
<td>500</td>
<td>46.5</td>
</tr>
</tbody>
</table>

NAMP: Not applicable. The occupant load is the maximum probable number of occupants present at any time.

All factors are expressed in gross area unless marked “net.”

See A.14.8.1.2

For the purpose of determining occupant load in mercantile occupancies where, due to differences in the finished ground level of streets on different sides, two or more floors directly accessible from streets (not including alleys or similar back streets) exist, each such floor is permitted to be considered a street floor. The occupant load factor is one person for each 40 ft\(^2\) (3.7 m\(^2\)) of gross floor area of sales space.

For the purpose of determining occupant load in mercantile occupancies with no street floor, as defined in 3.3.234, but with access directly from the street by stairs or escalators, the floor at the point of entrance to the mercantile occupancy is considered the street floor.

For any food court or other assembly use areas located in the mall concourse that are not included as a portion of the gross leasable area of the mall structure, the occupant load is calculated based on the occupant load factor for that use as specified in Table 14.8.1.2. The remaining mall concourse area is not required to be assigned an occupant load.

The portions of the mall concourse that are considered a pedestrian way and not used as gross leasable area are not required to be assessed an occupant load based on Table 14.8.1.2. However, means of egress from a mall pedestrian way concourse are required to be provided for an occupant load determined by dividing the gross leasable area of the mall structure building (not including anchor storesbuildings) by the appropriate lowest whole number occupant load factor from Figure 14.8.1.2(a) or Figure 14.8.1.2(b).

Each individual tenant space is required to have means of egress to the outside or to the mall concourse based on occupant loads calculated by using the appropriate occupant load factor from Table 14.8.1.2.

Each individual anchor store is required to have means of egress independent of the mall concourse.

See A.14.8.1.2.

[101]: Table 7.3.1.2

Figure 14.8.1.2(a) Mall Structure Occupant Load Factors (U.S. Customary Units). [101:Figure 7.3.1.2(a)]

****INSERT FIGURE****

Figure 14.8.1.2(b) Mall Structure Occupant Load Factors (SI Units). [101:Figure 7.3.1.2(b)]

****INSERT FIGURE****
A.14.8.1.2

The normal occupant load is not necessarily a suitable criterion, because the greatest hazard can occur when an unusually large crowd is present, which is a condition often difficult for AHJs to control by regulatory measures. The principle of this Code is to provide means of egress for the maximum probable number of occupants, rather than to attempt to limit occupants to a number commensurate with available means of egress. However, limits of occupancy are specified in certain special cases for other reasons. [101:A.7.3.1.2]

Suggested occupant load factors for components of large airport terminal buildings are given in Table A.14.8.1.2. However, the AHJ might elect to use different occupant load factors, provided that egress requirements are satisfied. [101:A.7.3.1.2]

Table A.14.8.1.2 Airport Terminal Occupant Load Factors

<table>
<thead>
<tr>
<th>Airport Terminal Area</th>
<th>ft² (gross)</th>
<th>m² (gross)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concourse</td>
<td>100</td>
<td>9.3</td>
</tr>
<tr>
<td>Waiting areas</td>
<td>15</td>
<td>1.4</td>
</tr>
<tr>
<td>Baggage claim</td>
<td>20</td>
<td>1.9</td>
</tr>
<tr>
<td>Baggage handling</td>
<td>300</td>
<td>27.9</td>
</tr>
</tbody>
</table>

[101:Table A.7.3.1.2]

The figure used in determining the occupancy load for mall shopping centers of varying sizes was arrived at empirically by surveying over 270 mall shopping centers, by studying mercantile occupancy parking requirements, and by observing the number of occupants per vehicle during peak seasons. [101:A.7.3.1.2]

These studies show that, with an increase in shopping center size, there is a decrease in the number of occupants per square foot of gross leasable area. [101:A.7.3.1.2]

This phenomenon is explained when one considers that, above a certain shopping center gross leasable area [approximately 600,000 ft² (56,000 m²)], there exists a multiplicity of the same types of stores. The purpose of duplicate types of stores is to increase the choices available to a customer for any given type of merchandise. Therefore, when shopping center size increases, the occupant load increases as well, but at a declining rate. In using Table Figure A.14.8.1.2(a) or Figure 14.8.1.2(b), the occupant load factor is applied only to the gross leasable area that uses the mall concourse as a means of egress. [101:A.7.3.1.2]

[101:A.7.3.1.2]

The value for concentrated business use is intended to address business use spaces with a higher density of occupants than would normally be expected in a general business occupancy. Where furnishings and floor layouts are arranged to maximize the number of occupants in the space, the value
for concentrated business use should be applied. Examples of concentrated business use areas are call centers, trading floors, and data processing centers. \[101\]:A.7.3.1.2

Collaboration rooms/spaces are common to office buildings. Their principal function is to permit collaboration among occupants in the privacy of a small room/space. These rooms/spaces are primarily used by occupants of the business occupancy to transition temporarily from their regular workstation area in order to obtain privacy and to avoid disturbing other employees located in the open office environment. Collaboration rooms/spaces have been commonly referred to as quiet rooms, focus rooms, huddle rooms, and team rooms. \[101\]:A.7.3.1.2

Collaboration rooms/spaces are not considered conference rooms, since a conference room’s principal function is to be used for assembly purposes. \[101\]:A.7.3.1.2

14.8.2.2

Projections within the means of egress of not more than 4\(\frac{1}{2}\) in. (114 mm) on each side shall be permitted at a height of 38 in. (965 mm) and below. In the case of stair and landing handrails forming part of a guard, in accordance with 7.2.2.4.54.3 of NFPA 101, such projections shall be permitted at a height of 42 in. (1065 mm) and below. \[101\]:7.3.2.2

14.8.3 *Egress Capacity.

A.14.8.3

In egress capacity calculations, standard rounding should be used. \[101\]:7.3.3

14.8.3.1

Egress capacity for approved components of means of egress shall be based on the capacity factors shown in Table 14.8.3.1, unless otherwise provided in 14.8.3.2. \[101\]:7.3.3.1

<table>
<thead>
<tr>
<th>Table 14.8.3.1 Capacity Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Board and care</td>
</tr>
<tr>
<td>Health care, sprinklered</td>
</tr>
<tr>
<td>Health care, nonsprinklered</td>
</tr>
<tr>
<td>High-High-hazard contents</td>
</tr>
<tr>
<td>All others</td>
</tr>
</tbody>
</table>

\[101\]:Table 7.3.3.1

14.8.3.2 *

For stairways wider than 44 in. (1120 mm) and subject to the 0.3 in. (7.6 mm) width per person capacity factor, the capacity shall be permitted to be increased using the following equation:
The effective capacity of stairways has been shown by research to be proportional to the effective width of the stairway, which is the nominal width minus 12 in. (305 mm). This phenomenon, and the supporting research, were described in the chapter Chapter 59, “Movement of People Employing the Hydraulic Model in Assessing Emergency Movement,” in the first, second, and third fifth editions of the SFPE Handbook of Fire Protection Engineering and was also addressed in Appendix D of the 1985 edition of NFPA 101, among several other publications. In 1988, this appendix was moved to form Chapter 2 of the 1988 edition of NFPA 101M, Alternative Approaches to Life Safety. (This document was later designated as NFPA 101A and this chapter remained in the document through the 1998 edition.) In essence, the effective width phenomenon recognizes that there is an edge or boundary effect at the sides of a circulation path. It has been best examined in relation to stairway width, where the edge effect was estimated to be 6 in. (150 mm) on each side, but a similar phenomenon occurs with other paths, such as corridors and doors, although quantitative estimates of their edge effect are not as well established as they have been for stairways, at least those stairways studied in Canada during the late 1960s through the 1970s in office building evacuation drills and in crowd movement in a variety of buildings with assembly occupancy. [101:A.7.3.3.2]

More recent studies have not been performed to determine how the edge effect might be changing (or has changed) with demographic changes to larger, heavier occupants moving more slowly, and thus swaying laterally, to maintain balance when walking. The impact of such demographic changes, which are significant and influential for evacuation flow and speed of movement on stairs, for example, has the effect of increasing the time of evacuation in a way that affects all stair widths, but will be most pronounced for nominal widths less than 56 in. (1422 mm). [101:A.7.3.3.2]

Without taking into account occupant demographic changes in the last few decades that affect evacuation performance, especially on stairs, the formula for enhanced capacity of stairways wider than 44 in. (1120 mm) assumes that any portion of the nominal width greater than 44 in. (1120 mm) is as effective proportionally as the effective width of a nominal 44 in. (1120 mm) stair, that is, 32 in. (810 mm). Thus, the denominator (0.218) in the equation is simply the effective width of 32 in. (810 mm) divided by the capacity of 147 persons that is credited, by the 0.3 in. (7.6 mm) capacity factor in Table A.14.8.3.2 14.8.3.1, to the corresponding nominal width, 44 in. (1120 mm). [101:A.7.3.3.2]

The resulting permitted stairway capacities, based on occupant load of single stories (in accordance with 7.3.1.4 of NFPA 101), for several stairway widths are shown in Table A.14.8.3.2. [101:A.7.3.3.2]

### Table A.14.8.3.2 Stairway Capacities

$$C = 146.7 + \left( \frac{Wn - 44}{0.218} \right) \quad [14.8.3.2]$$

where:

- $C$ = capacity, in persons, rounded to the nearest integer
- $Wn$ = nominal width of the stair as permitted by 14.8.3.2 (in.) [101:7.3.3.2]
### Permitted Capacity (no. of persons)

<table>
<thead>
<tr>
<th>Nominal Width</th>
<th>Clear Width Between Handrails</th>
<th>Effective Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>mm</td>
<td>in.</td>
</tr>
<tr>
<td>120&lt;sup&gt;a&lt;/sup&gt;</td>
<td>36</td>
<td>915</td>
</tr>
<tr>
<td>147</td>
<td>44</td>
<td>1120</td>
</tr>
<tr>
<td>202</td>
<td>56</td>
<td>1420</td>
</tr>
<tr>
<td>257</td>
<td>68</td>
<td>1725</td>
</tr>
</tbody>
</table>

<sup>a</sup>A reasonable handrail incursion of only 4 in. (100 mm), into the nominal width, is assumed on each side of the stair, although 7.3.23.2 of NFPA 101 permits a maximum incursion of 4 1/2 in. (114 mm) on each side.

<sup>b</sup>Other Code sections limit the occupant load for such stairs more severely, (e.g., 50 persons in 7.2.2.2.1.2 of NFPA 101). Such lower limits are partly justified by the relatively small effective width of such stairs, which, if taken into account by Table 7.3.3.1 of NFPA 101, would result in a correspondingly low effective capacity of only 110 persons (24 divided by 0.218), or a more realistic capacity factor of 0.327, applicable to nominal width.

<sup>c</sup>A clear width of 60 in. (1525 mm) is the maximum permitted by the handrail reachability criteria of 7.2.2.4.1.2 of NFPA 101. Although some prior editions of the Code permitted wider portions of stairs [up to 88 in. (2240 mm), between handrails], such wider portions are less effective for reasonably safe crowd flow and generally should not be used for major crowd movement. To achieve the maximum possible, reasonably safe egress capacity for such stairs, retrofit of an intermediate — not necessarily central — handrail is recommended; for example, with an intermediate handrail located 36 in. (915 mm) from the closest side handrail. In this case, the effective capacity would be 358 persons for the formerly permitted, now retrofitted, stair. This is based on a retrofitted, effective width of about 78 in. (1980 mm) [subtracting 2 in. (51 mm) from each usable side of a handrail and assuming a 2 in. (51 mm) wide, retrofitted intermediate handrail].

[101:Table A.7.3.3.2]

### 14.8.3.4.1

The width of any means of egress, unless otherwise provided in 14.8.3.4.1.1 through 14.8.3.4.1.3, shall be as follows:

1. Not less than that required for a given egress component in this chapter or Chapter 7 or Chapters 11 through 43 of NFPA 101
2. Not less than 36 in. (915 mm) where another part of this chapter and Chapters 11 through 43 of NFPA 101 do not specify a minimum width.

[101:7.3.4.1]

### A.14.8.3.4.1.1

The criteria of 14.8.3.4.1.1, as initially written, were intended to provide for minimum widths for small spaces such as individual offices. The intent is that these reductions in required width apply to spaces formed by furniture and movable walls, so that accommodations can easily be made for mobility-impaired individuals. One side of a path could be a fixed wall, provided that the other side is movable. This does not exempt the door widths or widths of fixed-wall corridors, regardless of the number of people or length. The allowance for reduction in width has been expanded to include all exit accesses serving not more than six people where the travel length along the reduced-width path does not exceed
50 ft (15 m), regardless of occupancy or use of the space. [101:A.7.3.4.1.1]

Figure A.14.8.3.4.1.1(a) and Figure A.14.8.3.4.1.1(b) present selected anthropometric data for adults. The male and female figures depicted in the figures are average, 50th percentile, in size. Some dimensions apply to very large, 97.5 percentile, adults (noted as 97.5 P). [101:A.7.3.4.1.1]

Figure A.14.8.3.4.1.1(a) Anthropometric Data (in in.) for Adults; Males and Females of Average, 50th Percentile, Size; Some Dimensions Apply to Very Large, 97.5 Percentile (97.5 P), Adults. [101:Figure A.7.3.4.1.1(a)]

***INSERT FIGURE****

Figure A.14.8.3.4.1.1(b) Anthropometric Data (in mm) for Adults; Males and Females of Average, 50th Percentile, Size; Some Dimensions Apply to Very Large, 97.5 Percentile (97.5 P), Adults. [101:Figure A.7.3.4.1.1(b)]

***INSERT FIGURE****

14.8.3.4.1.3

The requirement of 14.8.3.4.1 shall not apply to the following:

1. Doors as otherwise provided for in 7.2.1.2 of NFPA 101
2. Aisles and aisle accessways in assembly occupancies as otherwise provided in Chapters 12 and 13 of NFPA 101
3. Industrial equipment access as otherwise provided in 40.2.5.32 of NFPA 101

[101:7.3.4.1.3]

14.9 Number of Means of Egress.

A.14.9

Section 14.9 requires a minimum number of means of egress, unless otherwise specified by an occupancy chapter in subsection——.2.4, which addresses number of means of egress. Several occupancy chapters establish not only the minimum number of means of egress but also the minimum number of actual exits that must be provided on each floor. For example, for new educational occupancies, 14.2.4 requires access to two exits and further requires that both of the exits be provided on the floor. In contrast, for industrial occupancies, 40.2.4.1.1 requires access to two exits and further requires that at least one of the exits be located on the floor. Access to the other exit can involve traveling to another floor via an egress component such as an open stair, provided that such open stair is permitted by the occupancy chapter’s provisions for the protection of vertical openings. [101:A.7.4.1]

In most occupancy chapters, meeting the requirements for egress capacities and travel distances means the required minimum number of means of egress will automatically be met. However, in occupancies characterized by high occupant loads, such as assembly and mercantile occupancies, compliance with requirements for more than two exits per floor might require specific attention. [101:A.7.4.1]
14.9.1.5
Doors other than the hoistway door; the elevator car door; and doors that are readily openable from the
car side without a key, a tool, special knowledge, or special effort, shall be prohibited at the point of
access to an elevator car. [101:7.4.1.5]

14.9.2.1.1 Number of Means of Egress.
The minimum number of means of egress for working space about electrical equipment, other than
existing electrical equipment, shall be in accordance with NFPA 70, Section 110.26(C) of NFPA 70.
[101:7.4.2.1.1]

14.9.2.1.2 Door Unlatching and Direction of Door Swing.
The method of door unlatching and direction of door swing for working space about electrical
equipment, other than existing electrical equipment, shall be in accordance with Section 110.26(C)(3) of
NFPA 70. [101:7.4.2.1.2]

14.9.2.2.1 Number of Means of Egress.
The minimum number of means of egress for working space about electrical equipment, other than
existing electrical equipment, shall be in accordance with NFPA 70, Section 110.33(A) of NFPA 70.
[101:7.4.2.2.1]

14.9.2.2.2 Door Unlatching and Direction of Door Swing.
The method of door unlatching and direction of door swing for working space about electrical
equipment, other than existing electrical equipment, shall be in accordance with Section 110.33(A)(3) of
NFPA 70. [101:7.4.2.2.2]

14.10.1.1
Exits shall be located, and exit access shall be arranged, so that exits are readily accessible at all times.
[101:7.5.1.1]

14.10.1.2
Corridors shall provide exit access without passing through any intervening rooms other than corridors,
lobbies, and other spaces permitted to be open to the corridor, unless otherwise provided in 14.10.1.2.4
and 14.10.1.2.23. [101:7.5.1.2]

14.10.1.5-2.1 *
Exit access shall be arranged so that there are no dead ends in corridors, unless permitted by, and
limited to the lengths specified in, Chapters 11 through 43 of NFPA 101. [101:7.5.1.2.15]

A.14.10.1.5-2.1
The terms dead end and common path of travel are commonly used interchangeably. Although the
concepts of each are similar in practice, they are two different concepts. [101:A.7.5.1.2.15]
A common path of travel exists where a space is arranged so that occupants within that space are able to travel in only one direction to reach any of the exits or to reach the point at which the occupants have the choice of two paths of travel to remote exits. Part (a) of Figure A.14.10.1.5-2.1 is an example of a common path of travel. [101:A.7.5.1.2.15]

**Figure A.14.10.1.5-2.1 Common Paths of Travel and Dead-End Corridors. [101:Figure A.7.5.1.2.15]**

***INSERT FIGURE***

While a dead end is similar to a common path of travel, a dead end can exist where there is no path of travel from an occupied space but can also exist where an occupant enters a corridor thinking there is an exit at the end and, finding none, is forced to retrace his or her path to reach a choice of exits. Part (b) of Figure A.14.10.1.5 is an example of such a dead-end arrangement. [101:A.7.5.1.2.15]

Combining the two concepts, Part (c) of Figure A.14.10.1.5-2.1 is an example of a combined dead-end/common path of travel problem. [101:A.7.5.1.2.15]

Common paths of travel and dead-end travel are measured using the same principles used to measure travel distance as described in Section 7.6 of NFPA 101. Starting in the room shown in Part (d) of Figure A.14.10.1.5-2.1, measurement is made from the most remote point in the room, A, along the natural path of travel, and through the doorway along the centerline of the corridor to point C, located at the centerline of the corridor, which then provides the choice of two different paths to remote exits; this is common path of travel. The space between point B and point C is a dead end. (See 3.3.70 for the definition of common path of travel.) [101:A.7.5.1.2.15]

### 14.10.1.2.1

Approved existing corridors that require passage through a room to access an exit shall be permitted to continue to be used, provided that all of the following criteria are met:

1. The path of travel is marked in accordance with Section 14.14.
2. Doors to such rooms comply with 7.2.1 of NFPA 101.
3. Such arrangement is not prohibited by the applicable occupancy chapter in NFPA 101.

[101:7.5.1.2.24]

### 14.10.1.2.2

Corridors that are not required to be fire resistance rated shall be permitted to discharge into open floor plan areas. [101:7.5.1.2.32]

### A.14.10.1.3.2

Figure A.14.10.1.3.2(a) through Figure A.14.10.1.3.2(e) illustrate the method of measurement intended by 14.10.1.3.2. [101:A.7.5.1.3.2]

**Figure A.14.10.1.3.2(a) Diagonal Rule for Exit Remoteness. [101:Figure A.7.5.1.3.2(a)]**

***INSERT FIGURE***
14.10.1.3.4 *
In other than high-rise buildings, where exit enclosures are provided as the required exits specified in 14.10.1.3.2 or 14.10.1.3.3 and are interconnected by not less than a 1-hour fire-resistance-rated corridor, exit separation shall be measured along the shortest line of travel within the corridor [101:7.5.1.3.4]

14.10.1.4.2 *
Existing interlocking or scissor stairs shall be permitted to be considered separate exits, provided that they meet all of the following criteria:

(1) They are enclosed in accordance with Section 14.3.
(2) They are separated from each other by 2-hour fire-resistance-rated noncombustible construction.
(3) No protected or unprotected penetrations or communicating openings exist between the stair enclosures. [101:7.5.1.4.2]
from Hazards in Chapters 11 through 43 of NFPA 101. [101:7.5.1.56]

A.14.10.4.1
An accessible means of egress should comply with the accessible route requirements of ICC/ANSI A117.1, Accessible and Usable Buildings and Facilities. [101:A.7.5.4.1]

14.10.4.1.3
Accessible means of egress shall not be required in health care occupancies protected throughout by an approved, supervised automatic sprinkler system in accordance with Section -13.3. [101:7.5.4.1.3]

14.10.4.2.1
Where exit enclosures are provided as the required exits specified in 14.10.4.2 and are interconnected by not less than a 1-hour fire-resistance-rated corridor, exit separation shall be permitted to be measured along the line of travel within the corridor. [101:7.5.4.2.1]

14.10.4.2.2
The requirement of 14.10.4.2 shall not apply to buildings protected throughout by an approved, supervised automatic sprinkler system in accordance with Section -13.3. [101:7.5.4.2.2]

14.10.4.6
To be considered part of an accessible means of egress, a smoke barrier in accordance with Section -12.9 with not less than a 1-hour fire resistance rating, or a horizontal exit in accordance with 7.2.4 of NFPA 101, shall discharge to an area of refuge in accordance with 7.2.12 of NFPA 101. [101:7.5.4.6]

14.11.1.2
New exit discharge paths to a public way shall have a width of not less than 36 in. (915 mm) and existing exit discharge paths to a public way shall have a width of not less than 28 in. (710 mm). [101:7.7.1.2]

14.11.1.2-3
The requirement of 14.11.1 shall not apply to interior exit discharge as otherwise provided in 14.11.2. [101:7.7.1.32]

14.11.1.43
The requirement of 14.11.1 shall not apply to rooftop exit discharge as otherwise provided in 14.11.6. [101:7.7.1.43]

14.11.1.54
Means of egress shall be permitted to terminate in an exterior area of refuge for detention and correctional occupancies as otherwise provided in Chapters 22 and 23 of NFPA 101. [101:7.7.1.54]

14.11.2 Exit Discharge Through Interior Building Areas.
Exits shall be permitted to discharge through interior building areas, provided that all of the following are met:

1. Not more than 50 percent of the required number of exit stairs serving normally occupied areas of each floor, and not more than 50 percent of the exit stair capacity required for normally occupied areas of each floor, shall discharge through areas on any level of discharge, except as otherwise permitted by one of the following:
   a. One hundred percent of the exits shall be permitted to discharge through areas on any level of discharge in detention and correctional occupancies as otherwise provided in Chapters 22 and 23 of NFPA 101.
   b. In existing buildings, the 50 percent limit on egress capacity shall not apply if the 50 percent limit on the required number of exits is met.

2. Each level of discharge shall discharge directly outside at the finished ground level or discharge directly outside and provide access to the finished ground level by outside stairs or outside ramps.

3. The interior exit discharge shall lead to a free and unobstructed way to the exterior of the building, and such way shall be readily apparent or shall be identifiable by exit signage from the point of discharge from the exit.

4. The interior exit discharge shall be protected by one of the following methods:
   a. The level of discharge shall be protected throughout by an approved automatic sprinkler system in accordance with Section 13.3, or the portion of the level of discharge used for interior exit discharge shall be protected by an approved automatic sprinkler system in accordance with Section 13.3 and shall be separated from the nonsprinklered portion of the floor by fire barriers with a fire resistance rating meeting the requirements for the enclosure of exits. (See 14.3.1.)
   b. The interior exit discharge area shall be in a vestibule or foyer that meets all of the following criteria:
      i. The depth from the exterior of the building shall be not more than 10 ft (3050 mm), and the length shall be not more than 30 ft (9.1 m).
      ii. The foyer shall be separated from the remainder of the level of discharge by fire barriers with a minimum 1-hour fire resistance rating, and existing installations of wired glass in steel frames shall be permitted to be continued in use.
      iii. The foyer shall serve only as means of egress and shall include an exit directly to the outside.

5. The entire area on the level of discharge shall be separated from areas below by construction having a fire resistance rating not less than that required for the exit enclosure, unless otherwise provided in 14.11.2(6).

6. Levels below the level of discharge in an atrium shall be permitted to be open to the level of discharge where such level of discharge is protected in accordance with 8.6.7 of NFPA 101.

A.14.11.3.3
Examples include partitions and gates. The design should not obstruct the normal movement of occupants to the exit discharge. Signs, graphics, or pictograms, including tactile types, might be permitted for existing exit enclosures where partitions or gates would obstruct the normal movement of occupants to the exit discharge. [101:A.7.7.3.34]
Illumination of means of egress shall be provided in accordance with Section 14.12 for every building and structure where required in Chapters 11 through 43 of NFPA 101. For the purposes of this requirement, exit access shall include only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. For the purposes of this requirement, exit discharge shall include only designated stairs, aisles, corridors, ramps, escalators, walkways, and exit passageways leading to a public way. [101:7.8.1.1]

A.14.12.1.2.2
Photoluminescent materials and battery-powered luminaires require some period of time to restore themselves to full operational capacity after being de-energized. [101:A.7.8.1.2.2]

Photoluminescent products rely on nearby luminaires to maintain their full capacity. When those luminaires are de-energized, the photoluminescent product will gradually deplete its capacity. Listed photoluminescent exit signs and path markers are restored to full rated capacity within one hour and there is no known limit to the number of times they can be discharged and recharged, nor any known degradation of overall capacity or lifetime as a result of discharge/charge cycles. [101:A.7.8.1.2.2]

De-energizing the normal (utility) power source will automatically begin the battery discharge cycle of emergency luminaires, unit equipment, and exit signs provided with battery backup. Once drained, these batteries will typically require between 24 to and 72 hours, depending on the battery technology and charging circuitry design, to regain full capacity. Frequent discharge/charge cycles can reduce overall battery lifetime and, depending on battery technology, might also prematurely reduce overall battery capacity. [101:A.7.8.1.2.2]

14.12.1.3
The floors and other walking surfaces within an exit and within the portions of the exit access and exit discharge designated in 14.12.1.1 shall be illuminated as follows:

(1) During conditions of stair use, the minimum illumination for new stairs shall be at least 10 foot-candles (108 lux), measured at the walking surfaces.
(2) The minimum illumination for floors and other walking surfaces, other than new stairs during conditions of stair use, shall be to values of at least 1 foot-candle (10.8 lux), measured at the floor.
(3) In assembly occupancies, the illumination of the walking surfaces of exit access shall be at least 0.2 foot-candle (2.2 lux) during periods of performances or projections involving directed light.
(4)* The minimum illumination requirements shall not apply where operations or processes require low lighting levels. [101:7.8.1.3]

A.14.12.1.3(4)
Some processes, such as manufacturing or handling of photosensitive materials, cannot be performed in areas provided with the minimum specified lighting levels. The use of spaces with lighting levels below 1 foot-candle (10.8 lux) might necessitate additional safety measures, such as written emergency plans,
training of new employees in emergency evacuation procedures, and periodic fire drills. [101:A.7.8.1.3(54)]

14.12.1.4 *
Required illumination shall be arranged so that the failure of any single lighting unit does not result in an illumination level of less than 0.2 foot-candle (2.2 lux) in any designated area. [101:7.8.1.4]

14.13.1.1 *
Emergency lighting facilities for means of egress shall be provided in accordance with Section 14.13 for the following:

1. Buildings or structures where required in Chapters 11 through 43 of NFPA 101
2. Underground and limited-access structures as addressed in Section 11.7 of NFPA 101
3. High-rise buildings as required by NFPA 101
4. Doors equipped with delayed-egress locks
5. Stair shafts and vestibules of smokeproof enclosures, for which the following also apply:
   a. The stair shaft and vestibule shall be permitted to include a standby generator that is installed for the smokeproof enclosure mechanical ventilation equipment.
   b. The standby generator shall be permitted to be used for the stair shaft and vestibule emergency lighting power supply.
6. New sensor-release of electrical locking systems in accordance with 14.5.3.2 [101:7.9.1.1]

14.13.2.1.4
Testing of required emergency lighting systems shall be permitted to be conducted in accordance with 7.9.2.4 of NFPA 101. [101:7.9.3.1.4]

A.14.14.1.2.1
Where a main entrance also serves as an exit, it will usually be sufficiently obvious to occupants so that no exit sign is needed. [101:A.7.10.1.2.1]

The character of the occupancy has a practical effect on the need for signs. In any assembly occupancy, hotel, department store, or other building subject to transient occupancy, the need for signs will be greater than in a building subject to permanent or semipermanent occupancy by the same people, such as an apartment house where the residents are presumed to be familiar with exit facilities by reason of regular use thereof. Even in a permanent residence-type building, however, there is need for signs to identify exit facilities such as outside stairs that are not subject to regular use during the normal occupancy of the building. [101:A.7.10.1.2.1]

The requirement for the locations of exit signs visible from any direction of exit access is illustrated in Figure A.14.14.1.2.1. [101:A.7.10.1.2.1]

Figure A.14.14.1.2.1 Location of Exit Signs. [101:Figure A.7.10.1.2.1]

****INSERT FIGURE****
A.14.14.1.2.2
The direction of travel to the exit discharge within a stair enclosure with horizontal components in excess of the typical landings might need additional signage to be readily visible or obvious. Exit signs should be installed above doors through which the egress path leads. Directional exit signs should be installed where the horizontal egress path changes directions. The stairway marking signs required by 10.112.3, provided within the stair enclosure at each floor landing, indicate the vertical direction to exit discharge. [101:A.7.10.1.2.2]

Tactile signage shall be provided to meet all of the following criteria, unless otherwise provided in 14.14.1.4:

(1) Tactile signage shall be located at each exit door requiring an exit sign.
(2) Tactile signage shall read as follows: EXIT
(3) Tactile signage shall comply with ICC/ANSI A117.1, American National Standard for Accessible and Usable Buildings and Facilities. [101:7.10.1.3]

A.14.14.1.7
See 3.3.15445.2 of NFPA 101 for the definition of internally illuminated. [101:A.7.10.1.7]

A.14.14.1.8
In stores, for example, an otherwise adequate exit sign could be rendered inconspicuous by a high-intensity illuminated advertising sign located in the immediate vicinity. [101:A.7.10.1.8]

Red is the traditional color for exit signs and is required by law in many places. However, at an early stage in the development of NFPA 101, a provision made green the color for exit signs, following the concept of traffic lights in which green indicates safety and red is the signal to stop. During the period when green signs were specified by NFPA 101, many such signs were installed, but the traditional red signs also remained. In 1949, the Fire Marshals Association of North America voted to request that red be restored as the required exit sign color, because it was found that the provision for green involved difficulties in law enactment that were out of proportion to the importance of safety. Accordingly, the 10th edition of NFPA 101 specified red where not otherwise required by law. The present text avoids any specific requirement for color, based on the assumption that either red or green will be used in most cases and that there are some situations in which a color other than red or green could actually provide better visibility. [101:A.7.10.1.8]

14.14.2.1
A sign complying with 14.14.3, with a directional indicator showing the direction of travel, shall be placed in every location where the direction of travel to reach the nearest exit is not apparent. [101:7.10.2.1]

14.14.6.1.1
Externally illuminated signs required by 14.14.1 and 14.14.2, other than approved existing signs, unless
otherwise provided in 14.14.6.1.2, shall read EXIT or shall use other appropriate wording in plainly legible letters sized as follows:

(1) For new signs, the letters shall be not less than 6 in. (150 mm) high, with the principal strokes of letters not less than 3/4 in. (19 mm) wide.

(2) For existing signs, the required wording shall be permitted to be in plainly legible letters not less than 4 in. (100 mm) high.

(3) The word EXIT shall be in letters of a width not less than 2 in. (51 mm), except the letter I, and the minimum spacing between letters shall be not less than 3/8 in. (9.5 mm).

(4) Sign legend elements larger than the minimum established in 14.14.6.1.1(1) through 14.14.6.1.1(3) shall use letter widths, strokes, and spacing in proportion to their height.

A.14.14.6.2
Figure A.14.14.6.2 shows examples of acceptable locations of directional indicators with regard to left and right orientation. Directional indicators are permitted to be placed under the horizontal stroke of the letter T, provided that spacing of not less than 3/8 in. (9.5 mm) is maintained from the horizontal and vertical strokes of the letter T. [101:A.7.10.6.2]

Figure A.14.14.6.2 Directional Indicators. [101:Figure A.7.10.6.2]
****INSERT FIGURE****

14.14.6.2.1
Directional indicators, unless otherwise provided in 14.14.6.2.2, shall comply with all of the following:

(1) The directional indicator shall be located outside of the EXIT legend, not less than 3/8 in. (9.5 mm) from any letter.

(2) The directional indicator shall be of a chevron type, as shown in Figure 14.14.6.2.1.

(3) The directional indicator shall be identifiable as a directional indicator at a distance of 40 ft (12 m).

(4) A directional indicator larger than the minimum established for compliance with 14.14.6.2.1(3) shall be proportionately increased in height, width, and stroke.

(5) The directional indicator shall be located at the end of the sign for the direction indicated.

[101:7.10.6.2.1]

Figure 14.14.6.2.1 Chevron-Type Indicator. [101:Figure 7.10.6.2.1]
****INSERT FIGURE****


Externally illuminated signs shall be illuminated by not less than 5 foot-candles (54 lux) at the illuminated surface and shall have a contrast ratio of not less than 0.5. [101:7.10.6.3]

A.14.14.6.3
Colors providing a good contrast are red or green letters on matte white background. Glossy background and glossy letter colors should be avoided. [101:A.7.10.6.3]
The average luminance of the letters and background is measured in footlamberts or candela per square meter. The contrast ratio is computed from these measurements by the following formula:

\[
\text{Contrast} = \frac{L_g - L_e}{L_g}
\]

Where \(L_g\) is the greater luminance and \(L_e\) is the lesser luminance, either the variable \(L_g\) or \(L_e\) is permitted to represent the letters, and the remaining variable will represent the background. The average luminance of the letters and background can be computed by measuring the luminance at the positions indicated in Figure A.14.14.6.3 by numbered spots. [101:A.7.10.6.3]

Figure A.14.14.6.3 Measurement of Exit Sign Luminance. [101:Figure A.7.10.6.3]

****INSERT FIGURE****

A.14.14.7.2
Photoluminescent signs need a specific minimum level of light on the face of the sign to ensure that the sign is charged for emergency operation and legibility in both the normal and emergency modes. Additionally, the type of light source (for example, incandescent, fluorescent, halogen, metal halide) is important. Each light source produces different types of visible and invisible light (e.g., UV) that might affect the ability of some photoluminescent signs to charge and might also affect the amount of light output available during emergency mode. This type of sign would not be suitable where the illumination levels are permitted to decline. The charging light source should not be connected to automatic timers, because the continuous illumination of the sign is needed; otherwise, the sign illumination would not be available, because it would be discharged. [101:A.7.10.7.2]

Special signs, where required by other provisions of this Code, shall comply with the visual character requirements of ICC/ANSI A117.1, American National Standard for Accessible and Usable Buildings and Facilities. [101:7.10.8.2]

14.14.8.3.2
For other than previously approved existing NO EXIT signs, the sign shall comply with all of the following:

1. The NO EXIT sign shall have the word NO in letters 2 in. (51 mm) high, with a stroke width of \(\frac{3}{8}\) in. (9.5 mm),
2. and the word EXIT shall be in letters 1 in. (25 mm) high,
3. Larger signs shall retain the same letter-height-to-stroke-width ratio for the word NO and a 2:1 letter-height ratio between the words NO and EXIT,
4. with the word EXIT shall be located below the word NO, unless such sign is an approved existing sign.

[101:7.10.8.3.2]
A.16.1.3
See also NFPA 241. [101:A.4.6.10.32]

20.1.2.1
Combustible scenery of cloth, film, vegetation (dry), and similar materials shall comply with one of the following:
(1) They shall meet the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701.
(2) They shall exhibit a heat release rate not exceeding 100 kW when tested in accordance with NFPA 289 using the 20 kW ignition source. [101:12.4.76.11.1; 101:13.4.76.11.1]

20.1.2.2
Foamed plastics (see definition of cellular or foamed plastic in 3.3.421 of NFPA 101) shall be permitted to be used if they exhibit a heat release rate not exceeding 100 kW when tested in accordance with NFPA 289 using the 20 kW ignition source or by specific approval of the AHJ. [101:12.4.76.11.2; 101:13.4.76.11.2]

20.1.2.3
Scenery and stage properties not separated from the audience by proscenium opening protection shall be of noncombustible materials, limited-combustible materials, or fire-retardant-treated wood. [101:12.4.7.11.3; 101:13.4.76.11.3]

20.1.2.4
In theaters, motion picture theaters, and television stage settings assembly occupancies, with or without horizontal projections, and in simulated caves and caverns of foamed plastic, any single fuel package shall have a heat release rate not to exceed 100 kW where tested in accordance with one of the following:
(1) UL 1975, Fire Tests for Foamed Plastics Used for Decorative Purposes
(2) NFPA 289 using the 20 kW ignition source [101:12.4.76.11.4; 101:13.4.76.11.4]

A.20.1.4
Where a special amusement building is installed inside another building on a temporary basis, such as within an exhibit hall, the special amusement building requirements apply only to the portions of the building used as a special amusement building. For example, the smoke detectors required by 20.1.4.4 are not required to be connected to the building's fire alarm system. Where installed in an exhibit hall, such smoke detectors are also required to comply with the provisions applicable to an exhibit. [101:A.12.4.98; 101:A.13.4.98]

20.1.4.1 *General.
20.1.4.1.1*
Special amusement buildings, regardless of occupant load, shall meet the requirements for assembly occupancies in addition to the requirements of 20.1.4, unless the special amusement building is a multilevel play structure that is not more than 10 ft (3050 mm) in height and has aggregate horizontal projections not exceeding 160 ft² (15 m²). [101:12.4.9.1.18.1; 101:13.4.9.1.18.1]

A.20.1.4.1.1
The aggregate horizontal projections of a multilevel play structure are indicative of the number of children who might be within the structure and at risk from a fire or similar emergency. The word “aggregate” is used in recognition of the fact that the platforms and tubes that make up the multilevel play structure run above each other at various levels. In calculating the area of the projections, it is important to account for all areas that might be expected to be occupied within, on top of, or beneath the components of the structure when the structure is used for its intended function. [101:A.12.4.9.1.18.1; 101:A.13.4.9.1.18.1]

20.1.4.2*
Special amusement buildings shall be subclassified as follows:

1. Class A: Permanently installed special amusement buildings that include an amusement ride or device in which patrons are contained or restrained and are unable to evacuate without the assistance of the ride operator
2. Class B: Permanently installed special amusement buildings that do not include an amusement ride or device, or that include an amusement ride or device from which patrons are able to self-evacuate
3. Class C: Temporary or mobile special amusement buildings

[101:12.4.9.1.2; 101:13.4.9.1.2]

A.20.1.4.1.2
An example of a Class A special amusement building would be a theme park attraction or dark ride where patrons are restrained inside a ride vehicle and guided through a building on a track. [101:12.4.9.1.2; 101:13.4.9.1.2]

An example of a Class B special amusement building would be an escape room or theme park attraction where a patron can exit the building once the amusement or effects are stopped. Temporary rides such as a merry-go-round or train located in a mall would not meet the definition of a Class B special amusement building unless there was an element to the ride where a patron would become confused or is otherwise confined to the ride vehicle and unable to self-evacuate. See A.3.3.29.10. [101:12.4.9.1.2; 101:13.4.9.1.2]

An example of a Class C special amusement building would be a temporary haunted house, maze, or carnival attraction. [101:12.4.9.1.2; 101:13.4.9.1.2]

20.1.4.2 Means of Egress.

20.1.4.2.1 Exit Marking.
Exit marking shall be in accordance with Section 14.14. [101]:12.4.9.2.1.18.7.1; [101]:13.4.9.2.1.18.7.1

Floor proximity exit signs shall be provided in accordance with 14.14.1.6. [101]:12.4.9.2.1.28.7.2; [101]:13.4.9.2.1.28.7.2

In special amusement buildings where mazes, mirrors, or other designs are used to confound the egress path, approved directional exit marking that becomes apparent in an emergency shall be provided. [101]:12.4.9.2.1.38.7.3; [101]:13.4.9.2.1.38.7.3

Consideration should be given to the provision of directional exit marking on or adjacent to the floor. [101]:A.12.4.9.2.1.38.7.3; [101]:A.13.4.9.2.1.38.7.3

Lighting levels within special amusement buildings might be reduced to levels that are lower than those required by Section 7.8 of NFPA 101 for show purposes. In addition, projections, special effects, haze, and other theatrical elements might be combined, which can disorient occupants who are unfamiliar with the egress route. The activation of the automatic sprinkler system or smoke detection system should immediately increase illumination to the required levels and stop all show elements that would continue to disorient or confuse occupants. [101]:A.12.4.9.2.2.1; [101]:A.13.4.9.2.2.1

Because of the delay in verification or cross-zoning of smoke detectors, positive alarm sequence should not be utilized when alarm-verification or cross-zoned smoke detectors is selected. [101]:A.12.4.9.2.2.1; [101]:A.13.4.9.2.2.1

In the context of a special amusement building, a conflicting or confusing sound or visual is any audio or visual device that is intended to quickly distract the attention the patron of a special amusement building for the purpose of frightening, confounding, disorienting, or otherwise capturing the attention of the patron. Examples of this include strobing and flashing lights, loud sound effects, scare or jump effects, loud music, animated figures, projected animation, and interactive games. These can all
interfere with the fire alarm notification devices and live announcements from the attraction operator for the patron’s attention. In addition, effects that simulate the sound, sight, and smell of flames or smoke will confuse the patron if they continue to operate when the fire alarm system has been activated. [101:A.12.4.9.2.2.1; 101:A.13.4.9.2.2.1]

Some examples of audio and visuals that might occur in a special amusement building, but that might not constitute a conflicting sound or visual, include static or very slow-moving video or projected images, background music, steady state lighting, and ride vehicle triggered effects. [101:A.12.4.9.2.2.1; 101:A.13.4.9.2.2.1]

### 20.1.4.2.2.2

Class A special amusement buildings shall not be required to comply with 20.1.4.2.2.1 where all of the following conditions apply:

1. The emergency action plan required by 20.1.4.6.2 provides specific evacuation instructions to all attraction operators for cycling out the attraction when it is determined that meeting the requirements of 20.1.4.2.2.1 presents a hazard to ride patrons.
2. A means of manually complying with 20.1.4.2.2.1 is provided to the primary attraction operator.
3. Attraction operators are trained on the alternative procedures for evacuations.
4. The AHJ approves the modifications.

[A.20.1.4.2.2.2](12.4.9.2.2.2; 101:13.4.9.2.2.2)

### A.20.1.4.2.2.2

Amusement rides and devices that contain or restrain their patrons such that they are unable to evacuate without the assistance of a ride operator present a unique challenge during an emergency. ASTM F2291, Standard Practice for Design of Amusement Rides or Devices, provides for the design of evacuation paths in case the ride stops before completing its full cycle. The safest and fastest way to exit patrons during an emergency might be to “cycle out” by continuing ride operation until all patrons have exited the ride at the normal exit point (at the unload platform). If a patron were to attempt to exit the ride vehicle while the ride continues operation during an emergency, the patron may potentially be struck by the ride vehicle, or the ride’s safety systems might stop all ride motion, potentially extending the evacuation period. Because increasing the illumination of the means of egress along the ride and terminating any conflicting or confusing sounds or visuals while the ride is cycling out might entice the patrons to attempt to self-evacuate while the ride is in motion, the authority having jurisdiction and the owner are encouraged to work closely to develop a plan that implements the safest and most efficient method to exit the patrons from the ride, which might include continuing normal show operation during cycle out. In addition, the plan should assure that all ride operators and emergency responders understand their roles during cycle out, or during an evacuation if the ride cycle out is interrupted.

[A12.4.9.2.2.2; 101:A.13.4.9.2.2.2]

The ride owner should work with the authority having jurisdiction from an early stage to develop a pre-incident plan in accordance with NFPA 1620 and any required or applicable provisions of NFPA 101. [101:12.4.9.2.2.2; 101:A.13.4.9.2.2.2]
20.1.4.3 Interior Finish.
Interior wall and ceiling finish materials complying with Section 12.5 shall be Class A throughout.

20.1.4.4 Detection, Alarm, and Communications Systems.

20.1.4.4.1 General.

Class A and Class B special amusement buildings shall be provided with an approved fire alarm system and smoke detection system in accordance with 13.7.1 and 20.1.4.4. [101:12.4.9.4.1.1; 101:13.4.9.4.1.1]

20.1.4.4.2 Initiation.

A.20.1.4.4.2 Special amusement attractions might contain an operator console or "tower," which might also serve as a constantly attended location when the ride is operating.

20.1.4.4.2.1 In Class A and Class B special amusement buildings, the required fire alarm system shall be initiated by each of the following:

1. Manual fire alarm box located at a constantly attended location under continuous supervision by competent persons when the special amusement building is open to patrons
2. Required automatic sprinkler system
3. Required automatic detection systems

[101:12.4.9.4.2.1, 101:13.4.9.4.2.1]

20.1.4.4.2.2 Alarm Initiation.

In Class C special amusement buildings, activation of any smoke detection system device shall activate sound an audible and visible alarm at an a constantly attended receiving station within the building when occupied for purposes of initiating emergency action on the premises. [101:12.4.8.512.4.9.4.2.2, 101:13.4.8.513.4.9.4.2.2]

20.1.4.3 Smoke Detection.
Where the nature of the special amusement building is such that it operates in reduced lighting levels, the building shall be protected throughout by an approved automatic smoke detection system in accordance with Section 13.7. [101:12.4.9.4.38.4; 101:13.4.9.4.38.4]
20.1.4.4.4* Notification.

A.20.1.4.4.4
Notification in special amusement buildings should be considered carefully depending on the operation of the special amusement. Voice announcements are the required method. However, automatically transmitted evacuation instructions might not be appropriate in some rides when occupants are confined to a ride vehicle and unable to self-evacuate. In order to avoid confusion, manual voice announcements from the ride operator might be preferable to pre-recorded evacuation instructions for some rides. [101]:A.12.4.9.4.4, 101]:A.13.4.9.4.4

20.1.4.4.4.1
Occupant notification for Class A and Class B special amusement buildings shall be in accordance with 13.7.2.1.3. [101]:12.4.9.4.4.1, 101]:13.4.9.4.4.1

12.4.9.4.4.2
Occupant notification for Class C special amusement buildings shall be in accordance with 13.7.2.1.3; however, positive alarm sequence shall not be permitted. [101]:12.4.9.4.4.2, 101]:13.4.9.4.4.2

12.4.9.4.4.3*
An automatic means for sounding the general evacuation alarm shall be provided when the constantly attended location is not staffed. [101]:12.4.9.4.4.3, 101]:13.4.9.4.4.3

A.12.4.9.4.4.3
Special amusement buildings that contain rides tend be occupied after operating hours by maintenance staff. After-hours maintenance work might take place along the ride track or in an attached maintenance bay where ride vehicles are moved on and off spur tracks. When no ride operator is located at the constantly attended location to receive alarm signals, a means of automatically sounding the general evacuation signal should be provided for after-hours occupants. [101]:A.12.4.9.4.4.3, 101]:A.13.4.9.4.4.3

20.1.4.5 Extinguishment Requirements.

20.1.4.5.1*Automatic Sprinklers.
Every special amusement building, other than buildings or structures not exceeding 10 ft (3050 mm) in height and not exceeding 160 ft² (15 m²) in aggregate horizontal projection, shall be protected throughout by an approved, supervised automatic sprinkler system installed and maintained in accordance with Section 13.3. [101]:12.4.9.5.18.2; 101]:13.4.9.5.18.2

A.20.1.4.2A.20.1.4.5.1
See A.20.1.4.1. [101]:A.12.4.9.5.18.2; 101]:A.13.4.9.5.18.2

20.1.4.3.20.1.4.5.2 Temporary Water Supply.
Where the special amusement building required to be sprinklered by 20.1.4.220.1.4.5.1 is movable or portable, the sprinkler water supply shall be permitted to be provided by an approved temporary means. [101:12.4.9.5.28.3; 101:13.4.9.5.28.3]

20.1.4.6 Operating Features.

20.1.4.6.1* Furnishings, Decorations, and Scenery.
Furnishings shall be in accordance with 20.1.5.4. [101:12.4.9.6.1, 101:13.4.9.6.1]

A.20.1.4.6.1
Special amusement buildings might simulate different structures, such as an outdoor scene where false walls and ceilings, commonly known as sets, are recreated indoors with various fabrics and materials used to simulate trees, leaves, or other items. Sets in special amusement buildings are often designed by entertainment companies familiar with Broadway-style stage productions. However, unlike stages and theaters, there are no requirements for smoke control or proscenium protection. The authority having jurisdiction should consider and evaluate the total quantity of material introduced into the space. [101:A.12.4.9.6.1, 101:A.13.4.9.6.1]

20.1.4.6.2* Emergency Action Plan.
In Class A special amusement buildings, the emergency action plan shall be reviewed and approved by the authority having jurisdiction. [101:12.4.9.6.2, 101:13.4.9.6.2]

A.20.1.4.6.2
The evacuation plan for special amusement buildings should consider the safest and fastest way to remove occupants from the structure. When a ride stops within the special amusement building, removing occupants from the ride system might present an extended evacuation. Additionally, hazards associated with the ride and show system might present electrical and entanglement challenges to occupants unfamiliar with the building. Evacuation of special amusement buildings can also pose challenges to the local fire department if they are not familiar with the nature of the building or ride system. Specialized equipment for rescue, ride vehicle-specific tools for releasing doors, and high-energy ride vehicle hazard awareness might all be required when evacuating from a location other than a load/unload station. [101:A.12.4.9.6.2, 101:A.13.4.9.6.2]
The ride owner should work with the authority having jurisdiction from an early stage to develop a pre-incident plan in accordance with NFPA 1620 and any required or applicable provisions of 12.4.2.5.2 of NFPA 101. [101:A.12.4.9.6.2, 101:A.13.4.9.6.2]

20.1.5.1.3 Inspection of Door Openings.
Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:14.5.10. [101:12.7.1.3]

20.1.5.2.3
Food preparation facilities shall be protected in accordance with Chapter 50 (NFPA 96) and shall not be required to have openings protected between food preparation areas and dining areas. [101:12.7.2.3; 101:13.7.2.3]
20.1.5.4.1 *
Fabrics and films used for decorative purposes, all draperies and curtains, and similar furnishings shall be
in accordance with the provisions of 12.6.21. [101:12.7.4.1; 101:13.7.4.1]

A.20.1.5.4.3
The phrase “unprotected materials containing foamed plastic” is meant to include foamed plastic items
covered by “thermally thin” combustible fabrics or paint. (See A.12.5.4.34.) [101:A.12.7.4.3; 101:A.13.7.4.3]

20.1.5.5.4.4
Exhibit booth construction materials shall be limited to the following:
(1) Noncombustible or limited-combustible materials
(2) Wood exceeding 1/4 in. (6.3 mm) nominal thickness
(3) Wood that is pressure-treated, fire-retardant wood meeting the requirements of NFPA 703
(4) Flame-retardant materials complying with one of the following:
   (a) They shall meet the flame propagation performance criteria contained in Test Method 1
       or Test Method 2, as appropriate, of NFPA 701.
   (b) They shall exhibit a heat release rate not exceeding 100 kW when tested in accordance
       with NFPA 289 using the 20 kW ignition source.
(5) Textile wall coverings, such as carpeting and similar products used as wall or ceiling finishes,
    complying with the provisions of 12.5.3 and 12.5.5.
(6) Plastics limited to those that comply with Sections 12.3.3 and 10.2 of NFPA 101 and
    Section 12.5
(7) Foamed plastics and materials containing foamed plastics having a heat release rate for any
    single fuel package that does not exceed 100 kW where tested in accordance with one of the
    following:
       (a) UL 1975, Fire Tests for Foamed Plastics Used for Decorative Purposes
       (b) NFPA 289 using the 20 kW ignition source
(8) Cardboard, honeycombed paper, and other combustible materials having a heat release rate for
    any single fuel package that does not exceed 150 kW where tested in accordance with one of the
    following:
       (a) UL 1975, Fire Tests for Foamed Plastics Used for Decorative Purposes
       (b) NFPA 289, using the 20 kW ignition source
[101:12.7.5.3.4; 101:13.7.5.3.4]

20.1.5.5.4.5
Curtains, drapes, and decorations shall comply with 12.6.21. [101:12.7.5.3.5; 101:13.7.5.3.5]

20.1.5.5.4.6
Acoustical and decorative material including, but not limited to, cotton, hay, paper, straw, moss, split
bamboo, and wood chips shall be flame-retardant treated to the satisfaction of the AHJ.
[101:12.7.5.3.6; 101:13.7.5.3.6]
20.1.5.5.4.7.1
The requirements of 20.1.5.5.4 shall not apply where otherwise permitted by the following:

(1) Ceilings that are constructed of open grate design or listed dropout ceilings in accordance with NFPA 13 shall not be considered ceilings within the context of 20.1.5.5.4.7.
(2) Vehicles, boats, and similar exhibited products having over 100 ft² (9.3 m²) of roofed area shall be provided with smoke detectors acceptable to the AHJ.
(3) The requirement of 20.1.5.5.4.7(2) shall not apply where fire protection of multilevel exhibit booths is consistent with the criteria developed through a life safety evaluation of the exhibition hall in accordance with 12.4.21 or 13.4.1 of NFPA 101, subject to approval of the AHJ.

A.20.1.5.6.2
Crowd managers and crowd manager supervisors need to clearly understand the required duties and responsibilities specific to the venue's emergency plan. The crowd management training program should include a clear appreciation of crowd dynamics factors including space, energy, time, and information, as well as specific crowd management techniques, such as metering. Training should involve specific actions necessary during normal and emergency operations, and include an assessment of people-handling capabilities of a space prior to its use, the identification of hazards, an evaluation of projected levels of occupancy, the adequacy of means of ingress and egress and identification of ingress and egress barriers, the processing procedures such as ticket collection, and the expected types of human behavior. Training should also involve the different types of emergency evacuations and, where required by the emergency plan, relocation and shelter-in-place operations, and the challenges associated with each. [101:A.12.7.6.2; 101:A.13.7.6.2]

20.1.5.10.3 Festival Seating.
Festival seating, as defined in 3.3.119, shall be prohibited within a building, unless otherwise permitted by one of the following:

(1) Festival seating shall be permitted in assembly occupancies having occupant loads of 250 or less.
(2) Festival seating shall be permitted in assembly occupancies where occupant loads exceed 250, provided that an approved life safety evaluation has been performed. (See 10.16.3.)

[101:12.2.5.64.1; 101:13.2.5.64.1]

20.1.5.11 Clothing.
Clothing and personal effects shall not be stored in corridors, and spaces not separated from corridors, unless otherwise permitted by one of the following:

(1) In new assembly occupancies, this requirement shall not apply to corridors, and spaces not separated from corridors, that are protected by an approved, supervised automatic sprinkler system in accordance with Section 13.3. [101:12.7.12(1)]
(2) In existing assembly occupancies, this requirement shall not apply to corridors, and spaces not separated from corridors, that are protected by an approved automatic sprinkler system in accordance with Section 13.3. [101:13.7.12(1)]
(3) This requirement shall not apply to corridors, and spaces not separated from corridors, that are protected by a smoke detection system in accordance with Section 13.3. [101:12.7.12(2); 101:13.7.12(2)]
(4) This requirement shall not apply to storage in metal lockers, provided that the required egress width is maintained. \[101:12.7.12(3); 101:13.7.12(3)]

20.1.5.12.1
Film or video projectors or spotlights utilizing light sources that produce particulate matter or toxic gases, or light sources that produce hazardous radiation, without protective shielding shall be located within a projection room complying with 12.3.2.1.2 of NFPA 101. \[101:12.4.87.3; 101:13.4.87.3\]

20.1.5.12.2
Every projection room shall be of permanent construction consistent with the building construction type in which the projection room is located and shall comply with the following:

(1) Openings shall not be required to be protected.
(2) The room shall have a floor area of not less than 80 ft\(^2\) (7.4 m\(^2\)) for a single machine and not less than 40 ft\(^2\) (3.7 m\(^2\)) for each additional machine.
(3) Each motion picture projector, floodlight, spotlight, or similar piece of equipment shall have a clear working space of not less than 30 in. (760 mm) on each side and at its rear, but only one such space shall be required between adjacent projectors. \[101:12.4.87.4; 101:13.4.87.4\]

Integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. \[101:12.7.14.1; 101:13.7.14.1\]

20.2.2.1
Flexible plan and open plan buildings shall comply with the requirements of 20.2.2 as modified by 20.2.2.2 through 20.2.2.5. \[101:14.4.43.1; 101:15.4.43.1\]

20.2.2.2
Each room occupied by more than 300 persons shall have two or more means of egress entering into separate atmospheres. \[101:14.4.43.2; 101:15.4.43.2\]

20.2.2.3
Where three or more means of egress are required, the number of means of egress permitted to enter into the same atmosphere shall not exceed two. \[101:14.4.43.3; 101:15.4.43.3\]

20.2.2.4
Flexible plan buildings shall be permitted to have walls and partitions rearranged periodically only if revised plans or diagrams have been approved by the AHJ. \[101:14.4.43.4; 101:15.4.43.4\]

20.2.2.5
Flexible plan buildings shall be evaluated while all folding walls are extended and in use as well as when they are in the retracted position. \[101:14.4.43.5; 101:15.4.43.5\]
20.2.3.2 Interior Wall and Ceiling Finish.

New and existing interior wall and ceiling finish materials complying with Section 12.5 shall be permitted as follows: [101:14.3.3.2; 101:15.3.3.2]

1. Exits — Class A [101:14.3.3.2(1); 101:15.3.3.2(1)]
2. In new educational occupancies other than exits — Class A or Class B [101:14.3.3.2(2)]
3. In existing educational occupancies, corridors and lobbies — Class A or Class B [101:15.3.3.2(2)]
4. Low-height partitions not exceeding 60 in. (1525 mm) and used in locations other than exits — Class A, Class B, or Class C [101:14.3.3.2(3); 101:15.3.3.2(3)]

20.2.3.3 New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:14.3.3.3.3]

20.2.4.2.3 Emergency egress drills shall be conducted as follows:

1. Not less than one emergency egress drill shall be conducted every month the facility is in session, unless both of the following criteria are met:
   a. In climates where the weather is severe, the monthly emergency egress drills shall be permitted to be deferred.
   b. The required number of emergency egress drills shall be conducted, and not less than four shall be conducted before the drills are deferred.
2. All occupants of the building shall participate in the drill.
3. One additional emergency egress drill, other than for educational occupancies that are open on a year-round basis, shall be required within the first 30 days of operation.

[101:14.7.2.3; 101:15.7.2.3]

20.2.4.2.4 Where permitted by the authority having jurisdiction, up to two of the emergency egress drills required by 20.2.4.2.3 shall be permitted to consist of alternative emergency drills for one or both of the following:

1. Targeted violence events
2. Natural hazard events

[101:14.7.2.4; 101:15.7.2.4]

A. 20.2.4.2.4

Many jurisdictions are now conducting other drills in addition to emergency egress drills. Targeted violence events can include everything from active shooters to use of other weapons intended to cause harm. Natural hazard drills generally consist of tornado or earthquake drills. [101:A.14.7.2.4; 101:A.15.7.2.4]

20.2.4.2.54 All emergency drill alarms shall be sounded on the fire alarm system. [101:14.7.2.54; 101:15.7.2.54]
20.2.4.3.3 Inspection of Door Openings.
Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:14.5.10. [101:14.7.3.3; 101:15.7.3.3]

20.2.4.4.1 Draperies, curtains, and other similar furnishings and decorations in educational occupancies shall be in accordance with the provisions of 12.6.212.6.1. [101:14.7.4.1; 101:15.7.4.1]

20.2.4.4.3 Artwork and teaching materials shall be permitted to be attached directly to the walls in accordance with the following: [101:14.7.4.3; 101:15.7.4.3]

1. In new educational occupancies, the artwork and teaching materials shall not exceed 20 percent of the wall area in a building that is not protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3. [101:14.7.4.3(1)]

2. In existing educational occupancies, the artwork and teaching materials shall not exceed 20 percent of the wall area in a building that is not protected throughout by an approved automatic sprinkler system in accordance with Section 13.3. [101:15.7.4.3(1)]

3. In new educational occupancies, the artwork and teaching materials shall not exceed 50 percent of the wall area in a building that is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3. [101:14.7.4.3(2)]

4. In existing educational occupancies, the artwork and teaching materials shall not exceed 50 percent of the wall area in a building that is protected throughout by an approved automatic sprinkler system in accordance with Section 13.3. [101:15.7.4.3(2)]

20.2.4.5 Unvented Fuel-Fired Heating Equipment.
Unvented fuel-fired heating equipment, other than gas space heaters in compliance with NFPA 54/ANSI Z223.1 shall be prohibited. [101:14.5.2.2; 101:15.5.2.2]

20.2.4.6 Integrated Fire Protection and Life Safety Systems.
In new and existing educational occupancies, integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101:14.7.6; 101:15.7.6.1]

20.3.2.1 Unvented fuel-fired heating equipment, other than gas space heaters in compliance with NFPA 54/ANSI Z223.1 shall be prohibited. [101:16.5.2.2; 101:17.5.2.2]

20.3.2.4.1 In new day-care occupancies, flexible plan and open plan buildings shall comply with the requirements of 20.3.2.4 as modified by 20.3.2.4.3 through 20.3.2.4.6. [101:16.4.43.1]

20.3.2.4.2 In existing day-care occupancies, flexible plan and open plan buildings shall comply with the requirements of 20.3.2.4 as modified by 20.3.2.4.3 and 20.3.2.4.4. [101:17.4.43.1]
20.3.2.4.3
Flexible plan buildings shall be permitted to have walls and partitions rearranged periodically only if revised plans or diagrams have been approved by the AHJ. [101:16.4.3.2; 101:17.4.43.2]

20.3.2.4.4
Flexible plan buildings shall be evaluated while all folding walls are extended and in use as well as when they are in the retracted position. [101:16.4.43.3; 101:17.4.43.3]

20.3.2.4.5
In new day-care occupancies, each room occupied by more than 300 persons shall have two or more means of egress entering into separate atmospheres. [101:16.4.43.4]

20.3.2.4.6
In new day-care occupancies, where three or more means of egress are required from a single room, the number of means of egress permitted to enter into a common atmosphere shall not exceed two. [101:16.4.43.5]

20.3.3.4.3
New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:16.3.3.3.3]

A.20.3.4.2.1
The requirements are, of necessity, general in scope, because it is recognized that they apply to all types of day-care occupancies as well as conditions of occupancies, such as truant day-care occupancies; occupancies for the mentally handicapped, vision impaired, hearing impaired, and speech impaired; adult day-care; care of infants; and day-care occupancies. It is fully recognized that no one code can meet all the conditions of the various buildings involved, and it will be necessary for site administrators, through the written fire emergency response plan, to issue supplements to these requirements; however, all supplements should be consistent with these requirements. Additionally, it is recommended that fire safety be a part of the educational programs of the occupancy for clients. [101:A.16.7.1; 101:A.17.7.1]

Fire emergency response plans need to be written and made available to all employees, including temporary or substitute staff, so that all employees know what is expected of them during a fire emergency. The elements needed in the written plan should be identified in coordination with the AHJ. [101:A.16.7.1; 101:A.17.7.1]

The facility fire emergency response plan might be a module of a facility disaster plan that covers other emergencies. [101:A.16.7.1; 101:A.17.7.1]

The proper safeguarding of clients during a fire emergency requires prompt and effective response by the facility employees in accordance with the fire emergency response plan. Duties covered under the plan should be assigned by position rather than by employee name. Such assignment ensures that, in
the absence of an employee, the duties of the position will be performed by a substitute or temporary employee assigned to the position. Temporary or substitute employees should be instructed in advance regarding their duties under the plan for the position to which they are assigned. [101:A.16.7.1; 101:A.17.7.1]

Written fire emergency response plans should include, but should not be limited to, information for employees regarding methods and devices available for alerting occupants of a fire emergency. Employees should know how the fire department is to be alerted. Even where automatic systems are expected to alert the fire department, the written plan should provide for backup alerting procedures by staff. Other responses of employees to a fire emergency should include the following:

1. Removal of clients in immediate danger to areas of safety, as set forth in the plan
2. Methods of using building features to confine the fire and its by-products to the room or area of origin
3. Control of actions and behaviors of clients during removal or evacuation activities and at predetermined safe assembly areas [101:A.16.7.1; 101:A.17.7.1]

The written plan should state clearly the facility policy regarding the actions staff are to take or not take to extinguish a fire. It should also incorporate the emergency egress and relocation drill procedures set forth in 20.3.4.2.2. [101:A.16.7.1; 101:A.17.7.1]

For additional guidance on emergency action plans, see NFPA 1600. This standard establishes a common set of criteria for disaster management, emergency management, and business continuity programs. [101:A.16.7.1; 101:A.17.7.1]

A.20.3.4.2.2.1

The requirements are, of necessity, general in scope, because it is recognized that they apply to all types of day-care occupancies as well as conditions of occupancies, such as truant day-care occupancies; and day-care occupancies for the mentally handicapped, vision impaired, hearing impaired, and speech impaired. It is fully recognized that no one code can meet all the conditions of the various buildings involved, and it will be necessary for site administrators to issue supplements to these requirements, but all supplements should be consistent with these requirements. [101:A.16.7.2.1; 101:A.17.7.2.1]

20.3.4.2.3.4 Inspection of Door Openings.

Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:4.5.10. [101:16.7.3.4; 101:17.7.3.4]

20.3.4.2.3.5.1

Draperies, curtains, and other similar furnishings and decorations in day-care occupancies, other than in day-care homes, shall be in accordance with the provisions of 12.6.12. [101:16.7.4.1; 101:17.7.4.1]

20.3.4.2.3.5.3

Artwork and teaching materials shall be permitted to be attached directly to the walls in accordance with the following:
In new day-care homes, the artwork and teaching materials shall not exceed 20 percent of the wall area in a building that is not protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3. \[101:16.7.4.3(1)\]

In existing day-care homes, the artwork and teaching materials shall not exceed 20 percent of the wall area in a building that is not protected throughout by an approved automatic sprinkler system in accordance with Section 13.3. \[101:16.7.4.3(2)\]

In new day-care homes, the artwork and teaching materials shall not exceed 50 percent of the wall area in a building that is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3. \[101:17.7.4.3(1)\]

In existing day-care homes, the artwork and teaching materials shall not exceed 50 percent of the wall area in a building that is protected throughout by an approved automatic sprinkler system in accordance with Section 13.3. \[101:17.7.4.3(2)\]

\[101:16.7.4.3; 101:17.7.4.3\]

\textbf{20.3.4.2.3.7 Integrated Fire Protection \textbf{and} Life Safety Systems.}

In new day-care occupancies, integrated fire protection \textbf{and} life safety systems shall be tested in accordance with 13.1.3.1. \[101:16.7.6, 101:17.7.6.1\]

\textbf{20.4.2.1.5 *}

Fire drills in health care occupancies shall include the \textit{transmission} of a fire alarm signal \textit{and} \textit{simulation} of emergency fire conditions \textit{and}, except as indicated in 20.4.2.1.8, include activation of the fire alarm system notification appliances. \[101:18.7.1.4; 101:19.7.1.4\]

\textbf{20.4.2.1.8}

When drills are conducted between 9:00 p.m. (2100 hours) and 6:00 a.m. (0600 hours), a coded announcement shall be permitted to be used \textit{instead of activating the fire alarm system notification appliances} instead of audible alarms. \[101:18.7.1.7; 101:19.7.1.7\]

\textbf{20.4.2.5.1 *}

Draperies, curtains, and other loosely hanging fabrics and films serving as furnishings or decorations in health care occupancies shall be in accordance with the provisions of 12.6.212.6.1 (see 18.3.5.40-11 or 19.3.5.40-11 of NFPA 101), and the following also shall apply:

\begin{itemize}
  \item[(1)] Such curtains shall include cubicle curtains.
  \item[(2)] Such curtains shall not include curtains at showers and baths.
  \item[(3)] Such draperies and curtains shall not include draperies and curtains at windows in patient sleeping rooms in sprinklered smoke compartments.
  \item[(4)] Such draperies and curtains shall not include draperies and curtains in other rooms or areas where the draperies and curtains comply with all of the following:
    \begin{itemize}
      \item[a.] Individual drapery or curtain panel area does not exceed 48 ft\(^2\) (4.5 m\(^2\)).
      \item[b.] Total area of drapery and curtain panels per room or area does not exceed 20 percent of the aggregate area of the wall on which they are located.
      \item[c.] \textbf{For existing healthcare occupancies, smoke compartment in which draperies or curtains are located is sprinklered in accordance with 13.3.2.11.}
    \end{itemize}
\end{itemize}
A.20.4.2.5.1

In addition to the provisions of 12.6.12, which deal with ignition resistance, additional requirements with respect to the location of cubicle curtains relative to sprinkler placement are included in NFPA 13.

20.4.2.5.4

Newly introduced mattresses within health care occupancies shall comply with one of the following provisions, unless otherwise provided in 20.4.2.5.5:

(1) The mattresses shall meet the criteria specified in 12.6.3.2 and 12.6.3.2.2.

(2) The mattresses shall be in a building protected throughout by an approved, supervised automatic sprinkler system in accordance with NFPA 13.

20.4.2.5.5

The requirements of 20.4.2.5.4, 12.6.3.2, and 12.6.3.2.2 shall not apply to mattresses belonging to the patient in sleeping rooms of existing nursing homes where the following criteria are met:

(1) A smoke detector shall be installed where the patient sleeping room is not protected by automatic sprinklers.

(2) Battery-powered single-station smoke detectors shall be permitted.

20.4.2.5.6

Combustible decorations shall be prohibited in any health care occupancy, unless one of the following criteria is met:

(1) They are flame-retardant or are treated with approved fire-retardant coating that is listed and labeled for application to the material to which it is applied.

(2)* The decorations meet the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701.

(3) The decorations exhibit a heat release rate not exceeding 100 kW when tested in accordance with NFPA 289 using the 20 kW ignition source.

(4)* The decorations, such as photographs, paintings, and other art, are attached directly to the walls, ceiling, and non-fire-rated doors in accordance with the following:

   (a) Decorations on non-fire-rated doors do not interfere with the operation or any required latching of the door and do not exceed the area limitations of 20.4.2.5.6(b), 20.4.2.5.6(c), or 20.4.2.5.6(d).

   (b) Decorations do not exceed 20 percent of the wall, ceiling, and door areas inside any room or space of a smoke compartment that is not protected throughout by an approved automatic sprinkler system in accordance with Section 13.3.
(c) Decorations do not exceed 30 percent of the wall, ceiling, and door areas inside any room or space of a smoke compartment that is protected throughout by an approved supervised automatic sprinkler system in accordance with Section 13.3.

(d) Decorations do not exceed 50 percent of the wall, ceiling, and door areas inside patient sleeping rooms having a capacity not exceeding four persons, in a smoke compartment that is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 13.3.

(5) In existing health care occupancies, they are decorations, such as photographs or paintings, in such limited quantities that a hazard of fire development or spread is not present.  

A.20.4.2.5.6(4)

The percentage of decorations should be measured against the area of any wall or ceiling, not the aggregate total of walls, ceilings, and doors. The door is considered part of the wall. The decorations must be located such that they do not interfere with the operation of any door, sprinkler, smoke detector, or any other life safety equipment. Other art might include hanging objects or three-dimensional items. [101:A.18.7.5.6(4); 101:A.19.7.5.6(4)]

20.4.2.5.7 Soiled Linen and Trash Receptacles.

20.4.2.5.7.1 *

Soiled linen or trash collection receptacles shall not exceed with capacities greater than 3264 gal (121 242 L) in capacity and shall be located in meet the following requirements:

(1) The average density of container capacity in a room or space shall not exceed 0.5 gal/ft² (20.4 L/m²).

(2) Mobile soiled linen or trash collection receptacles with capacities greater than 32 gal (121 L) shall be located in a room protected as a hazardous area when not attended.

(3) Container size and density shall not be limited in hazardous areas.  

A.20.4.2.5.7.1

It is not the intent to permit collection receptacles with a capacity greater than 64 gal (242 L) to be positioned at or near a nurses’ station based on the argument that such nurses’ station is constantly attended. The large collection receptacle itself needs to be actively attended by staff. Staff might leave the large receptacle in the corridor outside a patient room while entering the room to collect soiled linen or trash, but staff is expected to return to the receptacle, move on to the next room, and repeat the collection function. Where staff is not actively collecting material for placement in the receptacle, the receptacle is to be moved to a room protected as a hazardous area. [101:A.18.7.5.7.1; 101:A.19.7.5.7.1]

20.4.2.5.820.4.2.5.7.2 *

Containers greater than 64 gal (242 L) used solely for recycling clean waste or for patient records awaiting destruction shall be permitted to be excluded from the limitations of 20.4.2.5.7 where all the following conditions are met:
Each container is limited to a capacity of 96 gal (363 L) except as permitted by 20.4.2.5.8(2) or (3).

Containers with capacities greater than 96 gal (363 L) shall be located in a room protected as a hazardous area when not attended.

Container size shall not be limited in hazardous areas.

Containers for combustibles shall be labeled and listed as meeting the requirements of FM Approval 6921, Approval Standard for Containers for Combustible Waste; however, such testing, listing, and labeling shall not be limited to FM Approvals.

[101:18.7.5.7.2; 101:19.7.5.7.2]

A.20.4.2.5.8A.20.4.2.5.7.2

It is the intent that this provision allows permits recycling for of bottles, cans, paper and similar clean items that do not contain grease, oil, flammable liquids, or significant plastic materials using to use larger containers or have several adjacent containers and not require locating such containers in a room protected as be restricted to a hazardous area. Containers for medical records waiting shredding are often larger than 3264 gallons (242 L). These containers are not to be included in the calculations and limitations of 20.4.2.5.7. There is no limit on the number of these containers as FM Approval 6921, Approval Standard for Containers for Combustible Waste, ensures the FM Standard assures that the fire will not spread out of the container. FM approval standards are written for use with FM Approvals. The tests can be conducted by any approved laboratory. The portions of the standard referring to FM Approvals are not included in this reference. [101:A.18.7.5.7.2; 101:A.19.7.5.7.2]

20.4.2.5.7.3

The provisions of 12.6.8, applicable to containers for waste or linen, shall not apply. [101:18.7.5.7.3; 101:19.7.5.7.3]

20.4.2.6 *Portable Space-Heating Devices.

Portable space-heating devices shall be prohibited in all health care occupancies, unless both of the following criteria are met:

(1) Such devices are permitted to be used only in nonsleeping staff and employee areas.

(2) Such devices are listed and labeled for use as a freestanding, movable heater in accordance with UL 1278, Movable and Wall- or Ceiling-Hung Electric Room Heaters. The heating elements of such devices do not exceed 212°F (100°C).

[101:18.7.8; 101:19.7.8]

A.20.4.2.6

Portable space heaters complying with 20.4.2.6 should be permitted to be located in office areas, nurses stations, and other similar nonpatient spaces within the same smoke compartment as patient sleeping rooms.

20.4.2.7 Integrated Fire Protection and Life Safety Systems.
Integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. 

**20.4.3.2 New Interior Wall and Ceiling Finish.**

New interior wall and ceiling finish materials complying with Section 12.5 shall be permitted throughout if Class A, except as indicated in 20.4.3.2.1 or 20.4.3.2.2. [101:18.3.3.2]

**20.4.3.3**

New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:18.3.3.3.3]

**20.4.3.4.1 General.**

Interior finish within the modification area shall be in accordance with Section 12.5. [101:18.4.54.6.1]

**20.4.3.4.2 Interior Wall and Ceiling Finish.**

Newly installed interior wall and ceiling finish materials complying with Section 12.5 shall be permitted throughout nonsprinklered smoke compartments if the materials are Class A, except as otherwise permitted in 20.4.3.4.2.1 or 20.4.3.4.2.2. [101:18.4.54.6.2]

**20.4.3.4.2.1**

Walls and ceilings shall be permitted to have Class A or Class B interior finish in individual rooms having a capacity not exceeding four persons. [101:18.4.54.6.2.1]

**20.4.3.4.2.2**

Corridor wall finish not exceeding 48 in. (1220 mm) in height and restricted to the lower half of the wall shall be permitted to be Class A or Class B. [101:18.4.54.6.2.2]

**20.4.3.5.1**

Newly installed interior floor finish shall comply with Section 12.5. [101:18.4.54.6.3.1]

**20.4.3.5.2**

The requirements for newly installed interior floor finish in exit enclosures and corridors not separated from them by walls complying with 19.3.5.7 of NFPA 101 shall be as follows:

1. Unrestricted in smoke compartments protected throughout by an approved, supervised automatic sprinkler system in accordance with 19.3.5.7 of NFPA 101
2. Not less than Class I in smoke compartments not protected throughout by an approved, supervised automatic sprinkler system in accordance with 19.3.5.7 of NFPA 101

**20.5.2.1.1**

The administration of every residential board and care facility shall have, in effect and available to all supervisory personnel, written copies of a plan for protecting all persons in the event of fire, for keeping
persons in place, for evacuating persons to areas of refuge, and for evacuating persons from the building when necessary. [101:32.7.1.1; 101:33.7.1.1]

A.20.5.2.1.1
Where residents require evacuation or relocation assistance, the plan should address the specific needs for each resident, and adequate staffing should be provided as necessary to implement the plan. [101:A:32.7.1.1; 101:A:33.7.1.1]

20.5.2.1.4
A copy of the plan shall be readily available at all times within the facility. [101:32.7.1.4; 101:33.7.1.4]

20.5.2.2.1
All residents participating in the emergency action plans shall be trained in the proper actions to be taken in the event of fire. [101:32.7.2.1; 101:33.7.2.1]

20.5.2.3.3
The drills shall involve the actual evacuation of all residents to an assembly point, as specified in the emergency action plan, and shall provide residents with experience in egressing through all exits and means of escape required by this Code. [101:32.7.3.3; 101:33.7.3.3]

20.5.2.3.6
Residents who cannot meaningfully assist in their own evacuation or who have special health problems shall not be required to actively participate in the drill. Subsection 20.4.2 shall apply in such instances. [101:32.7.3.6; 101:33.7.3.6]

A.20.5.2.5
The requirements applicable to draperies/curtains, upholstered furniture, and mattresses apply only to new draperies/curtains, new upholstered furniture, and new mattresses. The word new means unused, normally via procurement from the marketplace, either by purchase or donation, of items not previously used. Many board and care facilities allow residents to bring into the board and care home upholstered furniture items from the resident's previous residence. Such items are not new and, thus, are not regulated. On the other hand, some of the larger board and care homes purchase contract furniture, as is done in hotels. Such new, unused furniture, whether purchased or received as a donation, is regulated by the requirements of 20.5.2.5.2. By federal law, mattresses manufactured and sold within the United States must pass testing per 16 CFR 1632 (FF4-72), “Standard for the Flammability of Mattresses and Mattress Pads.” [101:A:32.7.5; 101:A:33.7.5]

20.5.2.5.1
New draperies, curtains, and other similar loosely hanging furnishings and decorations in board and care facilities shall comply with 20.5.2.5.1.1 and 20.5.2.5.1.2. [101:32.7.5.1; 101:33.7.5.1]

20.5.2.5.1.1
New draperies, curtains, and other similar loosely hanging furnishings and decorations in board and care facilities shall be in accordance with the provisions of 12.6.212.6.1, unless otherwise permitted by 20.5.2.5.1.2. [101:32.7.5.1.1; 101:33.7.5.1.1]

**20.5.3.1.4.2**

New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:32.2.3.3.3.2]

**20.5.3.1.4.3 Existing Interior Floor Finish. (Reserved)**

(No requirements.) [101:33.2.3.3.3]

**20.5.3.2.4.3**

New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:32.3.3.3.3.3]

**20.6.2.1.1**

The administration of every ambulatory health care facility shall have, in effect and available to all supervisory personnel, written copies of a plan for the protection of all persons in the event of fire, for their evacuation to areas of refuge, and for their evacuation from the building when necessary. [101:20.7.1.1; 101:21.7.1.12]

**A.20.6.2.4**

The most rigid discipline with regard to prohibition of smoking might not be nearly as effective in reducing incipient fires from surreptitious smoking as the open recognition of smoking, with provision of suitable facilities for smoking. Proper education and training of the staff and attendants in the ordinary fire hazards and their abatement is unquestionably essential. The problem is a broad one, varying with different types and arrangements of buildings; the effectiveness of rules of procedure, which need to be flexible, depends in large part on the management. [101:A.20.7.4; 101:A.21.7.4]

**20.6.2.5.1 * **

Draperies, curtains, and other loosely hanging fabrics and films serving as furnishings or decorations in ambulatory health care occupancies shall be in accordance with the provisions of 12.6.212.6.1, and the following also shall apply:

(1) Such curtains shall include cubicle curtains.
(2) Such curtains shall not include curtains at showers. [101:20.7.5.1; 101:21.7.5.1]

**A.20.6.2.5.1**

In addition to the provisions of 12.6.212.6.1, which deal with ignition resistance, additional requirements with respect to the location of cubicle curtains relative to sprinkler placement are included in NFPA 13. [101:A.20.7.5.1; 101:A.21.7.5.1]

**20.6.2.5.2**
Newly introduced upholstered furniture shall comply with 12.6.3.2 and one of the following provisions:

1) The furniture shall meet the criteria specified in 12.6.2.1.2.
2) The furniture shall be in a building protected throughout by an approved, supervised automatic sprinkler system in accordance with NFPA 13.

20.6.2.5.3

Newly introduced mattresses shall comply with 12.6.3.2 and one of the following provisions:

1) The mattresses shall meet the criteria specified in 12.6.3.2.
2) The mattresses shall be in a building protected throughout by an approved, supervised automatic sprinkler system in accordance with NFPA 13.

20.6.2.5.4

Combustible decorations shall be prohibited, unless one of the following criteria is met:

1) They are flame-retardant.
2) The decorations meet the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701.
3) The decorations exhibit a heat release rate not exceeding 100 kW when tested in accordance with NFPA 289 using the 20 kW ignition source.
4) The decorations, such as photographs, paintings, and other art, are attached directly to the walls, ceiling, and non-fire-rated doors in accordance with the following:
   a) Decorations on non-fire-rated doors do not interfere with the operation or any required latching of the door and do not exceed the area limitations of 20.6.2.5.4(4)(b) or 20.6.2.5.4(4)(c).
   b) Decorations do not exceed 20 percent of the wall, ceiling, and door areas inside any room or space of a smoke compartment that is not protected throughout by an approved automatic sprinkler system in accordance with Section 13.3.
   c) Decorations do not exceed 30 percent of the wall, ceiling, and door areas inside any room or space of a smoke compartment that is protected throughout by an approved automatic sprinkler system in accordance with Section 13.3.

20.6.2.5.5.1

Soiled linen or trash collection receptacles shall not exceed capacities greater than 32-64 gal (121-242 L) shall be located in capacity, and all of the following also shall apply:

1) The average density of container capacity in a room or space shall not exceed 0.5 gal/ft² (20.4 L/m²).
2) Mobile soiled linen or trash collection receptacles with capacities greater than 32 gal (121 L) shall be located in a room protected as a hazardous area when not attended.
3) Container size and density shall not be limited in hazardous areas.

[101:20.7.5.2; 101:21.7.5.2]
[101:20.7.5.3; 101:21.7.5.3]
[101:20.7.5.4; 101:21.7.5.4]
[101:20.7.5.5.1; 101:21.7.5.5.1]
20.6.2.5.5.2 *

Containers greater than 64 gal (242 L) used solely for recycling clean waste or for patient records awaiting destruction shall be permitted to be excluded from the requirements of 20.6.2.5.5.1 where all the following conditions are met:

(1) Each container shall be limited to a maximum capacity of 96 gal (363 L)—except as permitted by 20.6.2.5.5.2(2) or (3).

(2) Containers with capacities greater than 96 gal (363 L) shall be located in a room protected as a hazardous area when not attended.

(3) Container size shall not be limited in hazardous areas.

(4) Containers for combustibles shall be labeled and listed as meeting the requirements of FM Approval 6921, Approval Standard for Containers for Combustible Waste; however, such testing, listing, and labeling shall not be limited to FM Approvals.

[101:20.7.5.5.2; 101:21.7.5.5.2]

A.20.6.2.5.5.2

It is the intent that this provision permits recycling of bottles, cans, paper and similar clean items that do not contain grease, oil, flammable liquids, or significant plastic materials using larger containers or several adjacent containers and not require locating such containers in a room protected as a hazardous area. Containers for medical records awaiting shredding are often larger than 64 gal (242 L). These containers are not to be included in the calculations and limitations of 20.6.2.5.5.1. There is no limit on the number of these containers, as FM Approval Standard 6921, Approval Standard for Containers for Combustible Waste, ensures that the fire will not spread outside of the container. FM approval standards are written for use with FM Approvals. The tests can be conducted by any approved laboratory. The portions of the standard referring to FM Approvals are not included in this reference.

[101:A.20.7.5.5.2; 101:A.21.7.5.5.2]

20.6.2.5.5.3

The provisions of 12.6.8, applicable to containers for waste or linen, shall not apply. [101:20.7.5.5.3; 101:21.7.5.5.3]

20.6.2.6 Portable Space-Heating Devices.

Portable space-heating devices shall be prohibited in all ambulatory health care occupancies, unless both of the following criteria are met:

(1) Such devices are used only in nonsleeping staff and employee areas.

(2) Such devices are listed and labeled for use as a freestanding, movable heater in accordance with UL 1278, Movable and Wall- or Ceiling-Hung Electric Room Heaters. The heating elements of such devices do not exceed 212°F (100°C).

[101:20.7.8; 101:21.7.8]

20.6.2.7 Integrated Fire Protection and Life Safety Systems.

Integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1.

[101:20.7.10; 101:21.7.10.1]
20.6.3.3.3

New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:20.3.3.3.3]

20.7.2.1.1

Detention and correctional facilities, or those portions of facilities having such occupancy, shall be provided with 24-hour staffing, and the following requirements also shall apply:

(1) Staff shall be within three floors or a 300 ft (91 m) horizontal distance of the access door of each resident housing area.

(2) For Use Condition III, Use Condition IV, and Use Condition V, the arrangement shall be such that the staff involved starts the release of locks necessary for emergency evacuation or rescue and initiates other necessary emergency actions within 2 minutes of alarm.

(3) The following shall apply to areas in which all locks are unlocked remotely in compliance with 22.2.11.1.8 or 23.2.11.1.8 of NFPA 101.

(a) Staff shall not be required to be within three floors or 300 ft (91 m) of the access door.

(b) The 10-lock, manual key exemption of 22.2.11.1.8.2 or 23.2.11.1.8.2 of NFPA 101 shall not be permitted to be used in conjunction with the alternative requirement of 20.7.2.1.1(3)(a). [101:22.7.1.1; 101:23.7.1.1]

20.7.2.4.1

Draperies and curtains, including privacy curtains, in detention and correctional occupancies shall be in accordance with the provisions of 12.6.2-1 [101:22.7.4.1; 101:23.7.4.1]

20.7.2.4.2

Newly introduced upholstered furniture within new detention and correctional occupancies shall be tested in accordance with the provisions of 12.6.2.1(2). [101:22.7.4.2]

20.7.2.4.3

Newly introduced upholstered furniture within existing detention and correctional occupancies shall be tested in accordance with the provisions meet the criteria specified in 12.6.23.1(2) and 12.6.23.2.1. [101:23.7.4.2]

20.7.2.4.4*

Newly introduced mattresses within new detention and correctional occupancies shall be tested in accordance with the provisions of 10.3.3. [101:22.7.4.3]

A.20.7.2.4.4

20.7.2.4.5*

Newly introduced mattresses within existing detention and correctional occupancies shall be tested in accordance with the provisions in 12.6.3.2 and 12.6.3.2.2. [101:23.7.4.3]

A.20.7.2.4.5A.20.7.2.4.3
Mattresses used in detention and correctional facilities should be evaluated with regard to the fire hazards of the environment. The potential for vandalism and excessive wear and tear also should be taken into account when evaluating the fire performance of the mattress. ASTM F1870, Standard Guide for Selection of Fire Test Methods for the Assessment of Upholstered Furnishings in Detention and Correctional Facilities, provides guidance for this purpose. ASTM F1870 also includes guidance on alternate fire test methods that can be used to assess whether a mattress meets the requirements 12.6.3.2 by simply melting and flowing away from the flame. [101:A.23.7.4.3]

20.7.2.8 Integrated Fire Protection and Life Safety Systems.
Integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101:22.7.8; 101:23.7.8.17]

20.7.3.2 New Interior Wall and Ceiling Finish.
New interior wall and ceiling finish materials complying with Section 12.5 shall be Class A or Class B in corridors, in exits, and in any space not separated from corridors and exits by partitions capable of retarding the passage of smoke; and Class A, Class B, or Class C in all other areas. The provisions of 12.5.9.1 shall not apply to new detention and correctional occupancies. [101:22.3.3.2]

20.7.3.4.2
New interior floor finish in exit enclosures and exit access corridors shall be not less than Class II. The provisions of 12.5.9.2 shall not apply to new detention and correctional occupancies. [101:22.3.3.3.2]

20.7.3.4.3
New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:22.3.3.3.3]

20.7.3.6.1 Interior Wall and Ceiling Finish.
Interior wall and ceiling finish materials complying with Section 12.5 shall be Class A in corridors, in exits, and in any space not separated from corridors and exits by partitions capable of retarding the passage of smoke; and Class A, Class B, or Class C in all other areas. [101:22.4.54.8.1]

20.7.3.6.2.1
Interior floor finish shall comply with Section 12.5. [101:22.4.54.8.2.1]

20.7.3.6.2.2
New interior floor finish in exit enclosures and exit access corridors shall be not less than Class I. [101:22.4.54.8.2.2]

20.7.3.6.2.3
Interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:22.4.54.8.2.3]

A.20.8.2.1.1
Employers are obligated to determine the degree to which employees are to participate in emergency
activities. Regulations of the U.S. Department of Labor (OSHA) govern these activities and provide options for employers, from total evacuation to aggressive structural fire fighting by employee brigades. *(For additional information, see 29 CFR 1910, Subparts E and L, “OSHA Regulations for Emergency Procedures and Fire Brigades.”)* [101]:A.28.7.1.1; 101:A.29.7.1.1

20.8.2.5.2.1
Newly introduced upholstered furniture shall meet the criteria specified in 12.6.23.1 and 12.6.3.2.2.1. [101]:28.7.6.2.1; 101:29.7.6.2.1

20.8.2.5.2.2
Newly introduced mattresses shall meet the criteria specified in 12.6.3.2 and 12.6.3.2.2. [101]:28.7.6.2.2, 101:29.7.6.2.2

20.8.2.6 Fuel-Fired Heaters.
Unvented fuel-fired heaters, other than gas space heaters in compliance with NFPA 54, shall not be used. [101]:28.5.2.2; 101:29.5.2.2

20.8.2.7 Integrated Fire and Life Safety Protection Systems.
In new hotels and dormitories, integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101]:28.7.8, 101:29.7.8.1

20.8.3.4.3
New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101]:28.3.3.3.3

20.8.3.5 Interior Floor Finish (Existing Nonsprinklered Buildings).
In nonsprinklered buildings, newly installed interior floor finish in exits and exit access corridors shall be not less than Class II in accordance with 12.5.89. [101]:29.3.3.3

20.9.2.3 Inspection of Door Openings.
Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101, 14.5.10. [101]:30.7.3; 101:31.7.3

In new high-rise apartment buildings, integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101]:30.7.4, 101:31.7.4.1

20.9.3.4.3
New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101]:30.3.3.3.3

20.9.3.5 Existing Interior Floor Finish.
In buildings utilizing Option 1 or Option 2, as defined in 31.1.1.1 of NFPA 101, newly installed interior floor finish in exits and exit access corridors shall be not less than Class II in accordance with 12.5.89.
20.10.3.2 Newly installed interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:26.3.3.3.2]

20.12.2.5 Inspection of Door Openings. Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:14.5.10. [101:36.7.7; 101:37.7.7]

20.12.2.6 Integrated Fire Protection and Life Safety Systems. In new apartment buildings, integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101:36.7.8; 101:37.7.8.1]

20.12.3.3 New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:36.3.3.3.3]

20.13.2.3 Portable Fire Extinguisher Training. Designated employees of business occupancies shall be periodically instructed in the use of portable fire extinguishers. [101:38.7.3; 101:39.7.3]

20.13.2.5 Inspection of Door Openings. Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:14.5.10. [101:38.7.7; 101:39.7.7]

20.13.3.2.1 Interior wall and ceiling finish materials complying with Section 12.5 shall be Class A or Class B in exits and in exit access corridors. [101:38.3.3.2.1; 101:39.3.3.2.1]

20.13.3.3 New interior floor finish shall comply with 12.5.89.1 or 12.5.89.2, as applicable. [101:38.3.3.3.3]

20.14.3.1 Inspection of Door Openings. Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:14.5.10. [101:40.7.3]

20.14.3.2 Integrated Fire Protection and Life Safety Systems. Integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101:40.7.4.1]

20.14.4.3.2 Interior floor finish in areas other than those specified in 20.14.4.3.1 shall not be required to comply with 12.5.89. [101:40.3.3.3.2]
20.15.3.1 Inspection of Door Openings.
Door openings shall be inspected in accordance with 7.2.1.145 of NFPA 101:42.9.3.

20.15.3.2 Integrated Fire Protection and Life Safety Systems.
Integrated fire protection and life safety systems shall be tested in accordance with 13.1.3.1. [101:42.9.4.1]

20.15.4.3.2 Interior floor finish in areas other than those specified in 20.15.4.3.1 shall not be required to comply with 12.5.89. [101:42.3.3.3.2]

21.1.4.2.4 Where dwarf, or “smash,” egress doors are provided in doors that accommodate aircraft, such doors shall be permitted for compliance with 21.1.4.2.1 through 21.1.4.2.3. [101:40.6.2.4]

21.1.4.4 Dead ends shall not exceed 50 ft (15 m) for other than high-high-hazard contents areas and shall not be permitted for high-high-hazard contents areas. [101:40.6.4]

21.1.5.1.4 Where dwarf, or “smash,” egress doors are provided in doors that accommodate aircraft, such doors shall be permitted for compliance with 21.1.5.1.1, 21.1.5.1.2, and 21.1.5.1.3. [101:42.6.1.4]

21.1.5.3 Dead ends shall not exceed 50 ft (15 m) for other than high-high-hazard contents areas and shall not be permitted for high-high-hazard contents areas. [101:42.6.3]

25.1.4.1 Where required by the provisions of Chapters 11 through 43 in of NFPA 101, occupancies with storage and handling of hazardous materials shall comply with the following codes unless otherwise modified by other provisions of NFPA 101: Chapter 66 for flammable and combustible liquids, NFPA 54, Chapter 66 for compressed gases and cryogenic fluids, Chapter 69 for liquefied petroleum gases and liquefied natural gases, NFPA 400, and NFPA 495. [101:8.7.3.1]

A.25.1.4.2 NFPA 58 permits the use of portable butane-fueled appliances in restaurants and in attended commercial food catering operations where fueled by a maximum of two 10 oz (0.28 kg) LP-Gas capacity, nonrefillable butane containers with a water capacity not in excess of 1.08 lb (0.4 kg) per container. Containers are required to be directly connected to the appliance, and manifolding of containers is not permitted. Storage of cylinders is also limited to 24 containers, with an additional 24 permitted where protected by a 2-hour fire-resistance-rated barrier. (See 4.1.3 of NFPA 101 and
Annex C of NFPA 101 for referenced documents on hazardous materials.) [101:A.8.7.3.2]

25.3.1.1
Where grandstand seating without backs is used indoors, rows of seats shall be spaced not less than 22 in. (560 mm) back-to-back. [101:12.4.109.2.1]

25.3.1.2
The depth of footboards and seat boards in grandstands shall be not less than 9 in. (230 mm); where the same level is not used for both seat foundations and footrests, footrests independent of seats shall be provided. [101:12.4.109.2.2]

25.3.1.3
Seats and footrests of grandstands shall be supported securely and fastened in such a manner that they cannot be displaced inadvertently. [101:12.4.109.2.3]

25.3.1.4
Individual seats or chairs shall be permitted only if secured in rows in an approved manner, unless seats do not exceed 16 in number and are located on level floors and within railed-in enclosures, such as boxes. [101:12.4.109.2.4]

25.3.1.5
The maximum number of seats permitted between the farthest seat in an aisle in grandstands and bleachers shall not exceed that shown in Table 25.3.1.5. [101:12.4.109.2.5]

<table>
<thead>
<tr>
<th>Application</th>
<th>Outdoors</th>
<th>Indoors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grandstands</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Bleachers [See 132.2.5.86.1.2 of NFPA 101]</td>
<td>20</td>
<td>9</td>
</tr>
</tbody>
</table>

[101:Table 12.4.109.2.5]

25.3.2.1
An outdoor wood grandstand shall be erected within not less than two-thirds of its height and, in no case, within not less than 10 ft (3050 mm) of a building, unless otherwise permitted by one of the following:

1) The distance requirement shall not apply to buildings having minimum 1-hour fire-fire-resistant construction with openings protected against the fire exposure hazard created by the grandstand.

2) The distance requirement shall not apply where a wall having minimum 1-hour fire-fire-resistant—rated construction separates the grandstand from the building.

[101:12.4.109.3.1]

25.3.2.2
An outdoor wood grandstand unit shall not exceed 10,000 ft² (929 m²) in finished ground level area or 200 ft (61 m) in length, and all of the following requirements also shall apply:

1. Grandstand units of the maximum size shall be placed not less than 20 ft (6100 mm) apart or shall be separated by walls having a minimum 1-hour fire resistance rating.
2. The number of grandstand units erected in any one group shall not exceed three.
3. Each group of grandstand units shall be separated from any other group by a wall having minimum 2-hour fire-resistance-rated construction extending 24 in. (610 mm) above the seat platforms or by an open space of not less than 50 ft (15 m).

The finished ground level area or length required by 25.3.2.2 shall be permitted to be doubled where one of the following criteria is met:

1. Where the grandstand is constructed entirely of labeled fire-retardant-treated wood that has passed the standard rain test, ASTM D2898, *Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing*.
2. Where the grandstand is constructed of members conforming to dimensions for heavy timber construction [Type IV (2HH)].

The highest level of seat platforms above the finished ground level or the surface at the front of any wood grandstand shall not exceed 20 ft (6100 mm).

The highest level of seat platforms above the finished ground level, or the surface at the front of a portable grandstand within a tent or membrane structure, shall not exceed 12 ft (3660 mm).

The height requirements specified in 25.3.2.4 and 25.3.2.5 shall be permitted to be doubled where constructed entirely of labeled fire-retardant-treated wood that has passed the standard rain test, ASTM D2898, or where constructed of members conforming to dimensions for heavy timber construction [Type IV (2HH)].

Portable grandstands shall conform to the requirements of Section 25.3 for grandstands and the requirements of 25.3.3.2 through 25.3.3.7.

Portable grandstands shall be self-contained and shall have within them all necessary parts to withstand and restrain all forces that might be developed during human occupancy.
25.3.3.3 Portable grandstands shall be designed and manufactured so that, if any structural members essential to the strength and stability of the structure have been omitted during erection, the presence of unused connection fittings shall make the omissions self-evident. [101:12.4.109.4.3]

25.3.3.4 Portable grandstand construction shall be skillfully accomplished to produce the strength required by the design. [101:12.4.109.4.4]

25.3.3.5 Portable grandstands shall be provided with base plates, sills, floor runners, or sleepers of such area that the permitted bearing capacity of the supporting material is not exceeded. [101:12.4.109.4.5]

25.3.3.6 Where a portable grandstands rests directly on a base of such character that it is incapable of supporting the load without appreciable settlement, mud sills of suitable material, having sufficient area to prevent undue or dangerous settlement, shall be installed under base plates, runners, or sleepers. [101:12.4.109.4.6]

25.3.3.7 All bearing surfaces of portable grandstands shall be in contact with each other. [101:12.4.109.4.7]

25.3.4 Spaces Underneath Grandstands.
Spaces underneath a grandstand shall be kept free of flammable or combustible materials, unless protected by an approved, supervised automatic sprinkler system in accordance with Section 13.3 or unless otherwise permitted by one of the following:

1. This requirement shall not apply to accessory uses of 300 ft² (28 m²) or less, such as ticket booths, toilet facilities, or concession booths where constructed of noncombustible or fire-resistant construction in otherwise nonsprinklered facilities.

2. This requirement shall not apply to rooms that are enclosed in not less than 1-hour fire-resistance–rated construction and are less than 1000 ft² (93 m²) in otherwise nonsprinklered facilities. [101:12.4.109.5]

25.3.5 Guards and Railings.

25.3.5.1 Railings or guards not less than 42 in. (1065 mm) above the aisle surface or footrest or not less than 36 in. (915 mm) vertically above the center of the seat or seat board surface, whichever is adjacent, shall be provided along those portions of the backs and ends of all grandstands where the seats are more than 48 in. (1220 mm) above the floor or the finished ground level. [101:12.4.109.6.1]
25.3.5.2
The requirement of 25.3.5.1 shall not apply where an adjacent wall or fence affords equivalent safeguard. [101:12.4.109.6.2]

25.3.5.3
Where the front footrest of any grandstand is more than 24 in. (610 mm) above the floor, railings or guards not less than 33 in. (825 mm) above such footrests shall be provided. [101:12.4.109.6.3]

25.3.5.4
The railings required by 25.3.5.3 shall be permitted to be not less than 26 in. (660 mm) high in grandstands or where the front row of seats includes backrests. [101:12.4.109.6.4]

25.3.5.5
Cross aisles located within the seating area shall be provided with rails not less than 26 in. (660 mm) high along the front edge of the cross aisle. [101:12.4.109.6.5]

25.3.5.6
The railings specified by 25.3.5.5 shall not be required where the backs of the seats in front of the cross aisle project 24 in. (610 mm) or more above the surface of the cross aisle. [101:12.4.109.6.6]

25.3.5.7
Vertical openings between guardrails and footboards or seat boards shall be provided with intermediate construction so that a 4 in. (100 mm) diameter sphere cannot pass through the opening. [101:12.4.109.6.7]

25.3.5.8
An opening between the seat board and footboard located more than 30 in. (760 mm) above the finished ground level shall be provided with intermediate construction so that a 4 in. (100 mm) diameter sphere cannot pass through the opening. [101:12.4.109.6.8]

25.4.1.1
The horizontal distance of seats, measured back-to-back, shall be not less than 22 in. (560 mm) for seats without backs, and all of the following requirements shall also apply:

(1) There shall be a space of not less than 12 in. (305 mm) between the back of each seat and the front of each seat immediately behind it.
(2) If seats are of the chair type, the 12 in. (305 mm) dimension shall be measured to the front edge of the rear seat in its normal unoccupied position.
(3) All measurements shall be taken between plumb lines. [101:12.4.110.2.1]

25.4.1.2
The depth of footboards (footrests) and seat boards in folding and telescopic seating shall be not less
than 9 in. (230 mm). [101:12.4.110.2.2]

25.4.1.3
Where the same level is not used for both seat foundations and footrests, footrests independent of seats shall be provided. [101:12.4.110.2.3]

25.4.1.4
Individual chair-type seats shall be permitted in folding and telescopic seating only if firmly secured in groups of not less than three. [101:12.4.110.2.4]

25.4.1.5
The maximum number of seats permitted between the farthest seat in an aisle in folding and telescopic seating shall not exceed that shown in Table 25.3.1.5. [101:12.4.110.2.5]

25.4.2.1
Railings or guards not less than 42 in. (1065 mm) above the aisle surface or footrest, or not less than 36 in. (915 mm) vertically above the center of the seat or seat board surface, whichever is adjacent, shall be provided along those portions of the backs and ends of all folding and telescopic seating where the seats are more than 48 in. (1220 mm) above the floor or the finished ground level. [101:12.4.110.3.1]

25.4.2.2
The requirement of 25.4.2.1 shall not apply where an adjacent wall or fence affords equivalent safeguard. [101:12.4.110.3.2]

25.4.2.3
Where the front footrest of folding or telescopic seating is more than 24 in. (610 mm) above the floor, railings or guards not less than 33 in. (825 mm) above such footrests shall be provided. [101:12.4.110.3.3]

25.4.2.4
The railings required by 25.4.2.3 shall be permitted to be not less than 26 in. (660 mm) high where the front row of seats includes backrests. [101:12.4.110.3.4]

25.4.2.5
Cross aisles located within the seating area shall be provided with rails not less than 26 in. (660 mm) high along the front edge of the cross aisle. [101:12.4.110.3.5]

25.4.2.6
The railings specified by 25.4.2.5 shall not be required where the backs of the seats in front of the cross aisle project 24 in. (610 mm) or more above the surface of the cross aisle. [101:12.4.110.3.6]
Vertical openings between guardrails and footboards or seat boards shall be provided with intermediate construction so that a 4 in. (100 mm) diameter sphere cannot pass through the opening. [101:12.4.110.3.7]

25.4.2.8
An opening between the seat board and footboard located more than 30 in. (760 mm) above the finished ground level shall be provided with intermediate construction so that a 4 in. (100 mm) diameter sphere cannot pass through the opening. [101:12.4.110.3.8]

25.4.3.2
Maintenance and operation of folding and telescopic seating shall be the responsibility of the owner or his or her duly authorized representative and shall include all of the following:

(1) During operation of the folding and telescopic seats, the opening and closing shall be supervised by responsible personnel who shall ensure that the operation is in accordance with the manufacturer's instructions.
(2) Only attachments specifically approved by the manufacturer for the specific installation shall be attached to the seating.
(3) An annual inspection and required maintenance of each grandstand shall be performed to ensure safe conditions.
(4) At least biennially, the inspection shall be performed by a professional engineer, registered architect, or individual certified by the manufacturer. [101:12.7.11.2]

25.5.1.2 Testing.
Testing of membrane materials for compliance with the requirements of Section 25.5 for use of the categories of noncombustible and limited-combustible materials shall be performed on weathered-membrane material as defined in 3.3.179.81.5 of NFPA 101. [101:11.9.1.3]

25.5.3.2 Pressurization (Inflation) System.
The pressurization system shall consist of one or more operating blower units. The system shall include automatic control of auxiliary blower units to maintain the required operating pressure. Such equipment shall meet the following requirements:

(1) Blowers shall be powered by continuous-rated motors at the maximum power required.
(2) Blowers shall have personnel protection, such as inlet screens and belt guards.
(3) Blower systems shall be weather protected.
(4) Blower systems shall be equipped with backdraft check dampers.
(5) Not less than two blower units shall be provided, each of which has capacity to maintain full inflation pressure with normal leakage.
(6) The blowers shall be designed to be incapable of overpressurization.
(7) The auxiliary blower unit(s) shall operate automatically if there is any loss of internal pressure or if an operating blower unit becomes inoperative.
(8) The design inflation pressure and the capacity of each blower system shall be certified by a professional engineer.
A.25.5.3.3.1

The requirements of 25.5.3.3.1 can be considered as a Class 4, Type 60x system per NFPA 110.

25.6.1.3 Roof Covering Classification.

Roof membranes shall have a roof covering classification, as required by the applicable building codes, when tested in accordance with ASTM E108, *Standard Test Methods for Fire Tests of Roof Coverings*, or UL 790, *Test Methods for Fire Tests of Roof Coverings* or UL 790.

25.6.5.2 Pressurization (Inflation) System.

The pressurization system shall consist of one or more operating blower units. The system shall include automatic control of auxiliary blower units to maintain the required operating pressure. Such equipment shall meet the following requirements:

1. Blowers shall be powered by continuous-rated motors at the maximum power required.
2. Blowers shall have personnel protection, such as inlet screens and belt guards.
3. Blower systems shall be weather protected.
4. Blower systems shall be equipped with backdraft check dampers.
5. Not less than two blower units shall be provided, each of which has capacity to maintain full inflation pressure with normal leakage.
6. Blowers shall be designed to be incapable of overpressurization.
7. The auxiliary blower unit(s) shall operate automatically if there is any loss of internal pressure or if an operating blower unit becomes inoperative.
8. The design inflation pressure and the capacity of each blower system shall be certified by a professional engineer.

60.5.2

Where permitted by Chapters 11 through 43 of NFPA 101, alcohol-based hand-rub dispensers shall be permitted provided they meet all of the following criteria:

1. The maximum individual dispenser fluid capacity shall be as follows:
   - (a) 0.32 gal (1.2 L) for dispensers in corridors and areas open to corridors
   - (b) 0.53 gal (2.0 L) for dispensers in rooms or suites of rooms separated from corridors
2. Where aerosol containers are used, the maximum capacity of the aerosol dispenser shall be 18 oz. (0.51 kg) and shall be limited to Level 1 aerosols as defined in NFPA 30B.
3. Dispensers shall be separated from each other by horizontal spacing of not less than 48 in. (1220 mm).
4. Not more than an aggregate 10 gal (37.8 L) of alcohol-based hand-rub solution or 1135 oz (32.2 kg) of Level 1 aerosols, or a combination of liquids and Level 1 aerosols not to exceed, in total, the equivalent of 10 gal (37.8 L) or 1135 oz (32.2 kg), shall be in use outside of a storage cabinet in a single smoke compartment or fire compartment or story, whichever is less in area. One dispenser complying with 60.5.2(1) per room and located in that room shall not be included in the aggregated quantity.
(5) Storage of quantities greater than 5 gal (18.9 L) in a single smoke compartment or fire compartment or story, whichever is less in area, shall meet the requirements of NFPA 30.

(6) Dispensers shall not be installed in the following locations:
   (a) Above an ignition source for a horizontal distance of 1 in. (25 mm) to each side of the ignition source
   (b) To the side of an ignition source within a 1 in. (25 mm) horizontal distance from the ignition source
   (c) Beneath an ignition source within a 1 in. (25 mm) vertical distance from the ignition source

(7) Dispensers installed directly over carpeted floors shall be permitted only in sprinklered areas of the building.

(8) The alcohol-based hand-rub solution shall not exceed 95 percent alcohol content by volume.

(9) Operation of the dispenser shall comply with the following criteria:
   (a) The dispenser shall not release its contents except when the dispenser is activated, either manually or automatically by touch-free activation.
   (b) Any activation of the dispenser shall only occur when an object is placed within 4 in. (100 mm) of the sensing device.
   (c) An object placed within the activation zone and left in place shall not cause more than one activation.
   (d) The dispenser shall not dispense more solution than the amount required for hand hygiene consistent with label instructions.
   (e) The dispenser shall be designed, constructed, and operated in a manner that ensures accidental or malicious activation of the dispensing device is minimized.
   (f) The dispenser shall be tested in accordance with the manufacturer’s care and use instructions each time a new refill is installed.

[101:8.7.3.3]

F.1.2.3 ANSI Publications.
ANSI/BHMA A156.41, Standard for Door Hardware Single Motion to Egress, 2017.

F.1.2.8 ASTM Publications.
ASTM F2291, Standard Practice for Design of Amusement Rides or Devices, 2019
SFPE Guide to Human Behavior in Fire, 2018

F.1.2.15 FM Publications.

F.1.2.16 FPRF Publications.

F.3 References for Extracts in Informational Sections.
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1497 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

Technical Merit:
0 Abstentions
21 Agree (w/comment: Hanselka, Peterkin)
0 Disagree

Emergency Nature:
0 Abstentions
21 Agree (w/comment, Clary, Hanselka, Peterkin)
0 Disagree

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[
30 \text{ eligible} \div 2 = 15 + 1 = 16
\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is \textbf{16}.

(30 eligible to vote - 9 not returned - 0 abstentions = 21 \times 0.75 = 15.75)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

\textbf{Appeal Closing Date} for this TIA is \textbf{June 23, 2020}. 
### NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
### PROPOSED TIA NO. 1497 BALLOT - FINAL RESULTS

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1497 on various 101 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>Agree with updating extract.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Sarina L. Hart</td>
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<td>Agree</td>
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<tr>
<td>John A. Sharry</td>
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<td>Agree</td>
</tr>
<tr>
<td>Wade Palazini</td>
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<td>Agree</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>Upgraded Definitions should be incorporated</td>
</tr>
<tr>
<td>Scott T. Laramee</td>
<td></td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Kelly T. Nicoletto</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Raymond C. O’Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kenneth Earl Tyree, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Brian L. Olsen</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Disagree</td>
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<tr>
<td>Abstain</td>
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</tbody>
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**QUESTION NO. 2:** I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Not Returned : 9</td>
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</table>
F. Tom Fangmann, Brent L. Christopherson, Richard L. Day, Richard Kluge, Steven Taulbee, Philip Myers, Andrew Fukuda, H. Butch Browning, Jr., Marvin Dwayne Garriss

**Vote Selection**

<table>
<thead>
<tr>
<th>Agree</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>James S. Peterkin</td>
<td>21</td>
<td>These extracted text changes should be included with this upcoming edition.</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.</td>
</tr>
</tbody>
</table>

Catherine L. Stashak
Anthony C. Apfelbeck
Richard Jay Roberts
Carl F. Baldassarra
Kenneth E. Bush
Scott M. Bryant
Sarina L. Hart
John A. Sharry
Wade Palazini
Robert J. Davidson
Reinhard Hanselka
Terin Hopkins
Kelly T. Nicolello
Raymond C. O’Brocki

B & C
B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.”
A. The standard contains an error or an omission that was overlooked during the regular revision process.
B
A & B
E
A and B
User Safety Justifies
F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Agree
The standard contains an error or an omission that was overlooked during the regular revision process.
Kenneth Earl Tyree, Jr.

A. The standard contains an error or an omission that was overlooked during the regular revision process.

B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

C. The proposed TIA intends to correct a previously unknown existing hazard.

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen

B. I agree

Scott T. Laramee

Disagree 0

Abstain 0
Substantiation: The current text of NFPA 1 contains extracts from the last published edition of NFPA 5000 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 5000 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.

2.3.18 UL Publications.

2.4 References for Extracts in Mandatory Sections.

3.3.3 Addition.
An increase in the building area, aggregate floor area, building height, or number of stories of a structure. ([BLD-FUN] [5000, 2021])

3.3.23 Basement.
Any story of a building wholly or partly below grade plane that is not considered the first story above grade plane. (*See also 3.3.289.1 in NFPA 5000®, First Story Above Grade Plane.*) ([BLD-FUN] [5000, 2021])

3.3.30.6 High-Rise Building.
A building where the floor of an occupiable story is greater than 75 ft (23 m) above the lowest level of fire department vehicle access. ([5000, 2021])

A.3.3.30.6 High-Rise Building.
It is the intent of this definition that, in determining the level from which the highest occupiable floor is to be measured, the enforcing agency should exercise reasonable judgment, including consideration of overall accessibility to the building by fire department personnel and vehicular equipment. Where a building is situated on a sloping terrain and there is building access on more than one level, the enforcing agency might select the level that provides the most logical and adequate fire department access. ([5000, 2021])

3.3.53 Cleanroom.
A room in which the concentration of airborne particles is controlled to specified limits, including areas below the raised floor and above the ceiling grid if these areas are part of the air path and within the rated construction. ([5000, 2021])

3.3.94 Dispensing.
The pouring or transferring of a material from a container, tank, or similar vessel whereby vapors, dusts, fumes, mists, or gases could be liberated to the atmosphere. ([5000, 2021])

3.3.100* Dwelling Unit.
One or more rooms arranged for complete, independent housekeeping purposes, with space for eating, living, and sleeping; facilities for cooking; and provisions for sanitation. ([5000, 2021])
**A.303.100 Dwelling Unit.**

It is not the intent of the Code that the list of spaces in the definition of the term *dwelling unit* to be all inclusive. It is the intent of the Code that the list of spaces is a minimal set of criteria that must be provided to be considered a dwelling unit and, therefore, the dwelling unit can contain other spaces that are typical to a single-family dwelling. [5000, 2021]

**3.3.115 *Explosive Material.**

A chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. [BLD-IND] [5000, 2021]

**A.3.3.115 Explosive Material.**

The term *explosive material* includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, igniters, and Display fireworks, 1.3G (Class B, Special). The term *explosive* includes any material determined to be within the scope of Title 18, United States Code, Chapter 40, and also includes any material classified as an explosive other than Consumer Fireworks 1.4G (Class C, Common), by the Hazardous Materials Regulations of the U.S. Department of Transportation (DOT) in 49 CFR. [5000, 2021]

The former classification system used by the DOT included the terms *high explosive* and *low explosive*, as further defined in A.3.3.40 of NFPA 5000\(^\text{®}\). These terms remain in use by the U.S. Bureau of Alcohol, Tobacco, and Firearms, and Explosives. Explosive materials classified as hazard Class 1 are further defined under the current system applied by DOT. Compatibility group letters are used in concert with division numbers to specify further limitations on each division noted. For example, the letter G (as in 1.4G) identifies substances or articles that contain a pyrotechnic substance and similar materials. UN/DOT Class 1 Explosives are defined as follows:

1. **Division 1.1** explosives are explosives that are a mass explosion hazard, which is a hazard that instantaneously affects almost the entire load.
2. **Division 1.2** explosives are explosives that are a projection hazard but not a mass explosion hazard.
3. **Division 1.3** explosives are explosives that are a fire hazard and either a minor blast hazard or a minor projection hazard, or both, but not a mass explosion hazard.
4. **Division 1.4** explosives are explosives that pose a minor explosion hazard and meet both of the following criteria:
   a. The explosive effects are largely confined to the package, and no projection of fragments of appreciable size or range is to be expected.
   b. An external fire cannot cause virtually instantaneous explosion of almost the entire contents of the package.
5. **Division 1.5** explosives are very insensitive explosives that are comprised of substances that are a mass explosion hazard, but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.
Division 1.6 explosives are extremely insensitive articles that are not a mass explosion hazard, that are comprised of articles that contain only extremely insensitive detonating substances, and that demonstrate a negligible probability of accidental initiation or propagation.

3.3.140.1 *Gross Floor Area.
The floor area within the inside perimeter of the outside walls, or the outside walls and fire walls of a building, or outside and/or inside walls that bound an occupancy or incidental use area of the building under consideration, with no deductions for hallways, stairs, closets, thickness of interior walls, columns, elevator and building services shafts, or other features, but excluding floor openings associated with atriums and communicating spaces. ([BLD-MEA]) [5000, 202118]

A.3.3.140.1 Gross Floor Area.
Where the term floor area is used, it should be understood to be gross floor area, unless otherwise specified. [5000, 202118]

3.3.140.2 Net Floor Area.
The floor area within the inside perimeter of the outside walls, or the outside walls and fire walls of the a building, or outside and/or inside walls that bound an occupancy or incidental use area requiring the occupant load to be calculated using net floor area under consideration with deductions for hallways, stairs, closets, shafts, thickness of interior walls, columns, or-and other features. ([BLD-MEA]) [5000, 202118]

3.3.144 Garage.
A building or portion of a building in which one or more self-propelled vehicles carrying volatile flammable liquid for fuel or power are kept for use, sale, storage, rental, repair, exhibition, or demonstrating purposes, and all that portion of a building that is on or below the floor or floors in which such vehicles are kept and that is not separated therefrom by suitable cutoffs. ([BLD-IND]) [5000, 202118]

A.3.3.152 Hazard of Contents.
Hazardous materials are materials that present physical or health hazards and are regulated by the Code. The categories of materials classified as physical hazards, health hazards, or both have been established in concert with those categories identified by OSHA in 29 CFR that are used by preparers of Material Safety Data Sheets (MSDS). In some cases, the hazard categories are further subdivided into classes that have long been established by NFPA standards. For example, while OSHA recognizes flammable liquids as a broad class, including those that are combustible, such liquids are further categorized by building and fire codes with respect to degree of hazard under the system of classification used by NFPA to include Class I, Class II, and Class III liquids. They are further subdivided within these classes to Class IA, Class IB, and so forth. A similar approach is used for materials in other categories where there are subcategories of hazard established by existing NFPA standards, including oxidizers, unstable reactives, organic peroxides, water reactives, and others. [5000:A.6.3.22018]
Under the classification system used by OSHA, a hazardous material can have one or more physical or health hazards in categories not currently regulated by the Code; for example, irritants, sensitizers, radioactive materials, etiological agents, and others. This is not to say that these materials are not hazardous materials, but rather that the Code does not provide specific regulation for the hazard category represented. [5000:A.6.3.2A.6.3.2, 2018]

The Code defines contents as either high hazard, low hazard, or ordinary hazard. The category of high hazard, which includes hazardous materials, is subdivided into groups in which the hazards of the groups are comparable, for example, high hazard Level 1 through Level 5. (See also A.34.1.1 of NFPA 5000®.) [5000:A.6.3.2A.6.3.2, 2018]

3.3.152.1.2 High Hazard Level 2 Contents.
High hazard Level 2 contents shall include materials that present a deflagration hazard or a hazard from accelerated burning including, but not limited to, the following: (1) Class I, Class II, or Class III-A flammable or combustible liquids that are used or stored in normally open containers or systems, or in closed containers or systems at gauge pressures of more than 15 psi (103 kPa); (2) Combustible dusts stored, used, or generated in a manner creating a severe fire or explosion hazard; (3) Flammable gases and flammable cryogenic liquids; (4) Class I organic peroxides; (5) Class 3 solid or liquid oxidizers that are used or stored in normally open containers or systems, or in closed containers or systems at gauge pressures of more than 15 psi (103 kPa); (6) Nondetonable pyrophoric materials; (7) Class 3 nondetonable unstable (reactive) materials; (8) Class 3 water-reactive materials. [5000:6.3.2.4.3]

3.3.152.1.3 High Hazard Level 3 Contents.
High hazard Level 3 contents shall include materials that readily support combustion or present a physical hazard including, but not limited to, the following: (1) Level 2 and Level 3 aerosols; (2) Class I, Class II, or Class III-A flammable or combustible liquids that are used or stored in normally closed containers or systems at gauge pressures of less than 15 psi (103 kPa); (3) Flammable solids, other than dusts classified as high hazard Level 2, stored, used, or generated in a manner creating a high fire hazard; (4) Class II and Class III organic peroxides; (5) Class 2 solid or liquid oxidizers; (6) Class 3 solid or liquid oxidizers that are used or stored in normally closed containers or systems at gauge pressures of less than 15 psi (103 kPa); (7) Oxidizing gases and oxidizing cryogenic liquids; (8) Class 2 unstable (reactive) materials; (9) Class 2 water-reactive materials. [5000:6.3.2.4.4]

3.3.152.1.4 High Hazard Level 4 Contents.
High hazard Level 4 contents shall include materials that are acute health hazards including, but not limited to, the following: (1) Corrosives; (2) Highly toxic materials; (3) Toxic materials. [5000:6.3.2.4.5]

3.3.152.1.5 High Hazard Level 5 Contents.
High hazard Level 5 contents shall include hazardous production materials (HPM) used in the fabrication of semiconductors or semiconductor research and development. [5000:6.3.2.4.6]

3.3.173.1 *Ceiling Limit.
The maximum concentration of an airborne contaminant to which one can be exposed. (BLD-MEA)

A.3.3.173.1 Ceiling Limit.
The ceiling limits utilized are to be those published in 29 CFR 1910.1000. [5000, 202118]

3.3.174 Limited-Combustible (Material).
See 4.5.10. [5000, 202118]

3.3.175 Liquid.
A material that has a melting point that is equal to or less than 68°F (20°C) and a boiling point that is greater than 68°F (20°C) and at 14.7 psia (101.3 kPa). When not otherwise identified, the term liquid shall mean both flammable and combustible liquids. (BLD-IND) [5000, 202118]

3.3.184.5 Hazardous Production Material (HPM).
A solid, liquid, or gas associated with semiconductor manufacturing that has a degree-of-hazard rating of 3 or 4 in health, flammability, instability, or water reactivity in accordance with NFPA 704 and that is used directly in research, laboratory, or production processes that have as their end product materials that are not hazardous. [5000, 202118]

3.3.184.10 Limited-Combustible (Material).
See 4.5.10. [5000, 202118]

3.3.184.11 Noncombustible Material.
See 4.5.9. [5000, 202118]

A.3.3.196.15 Industrial Occupancy.
For laboratories within the scope of NFPA 45, the occupancies are defined in NFPA 45, Section 3.3, as follows:

(1) Noninstructional labs are considered industrial.
(2) Labs within the scope of NFPA 99 are considered health care.
(3) Instructional labs for grades 12 and below are considered educational.
(4) Labs for grades above grade 12 and Class D labs are business occupancies.

[5000, 202118]

3.3.196.31.1 *Mini-Storage Building.
A storage occupancy partitioned into individual storage units, with a majority of the individual units not greater than 750 ft² in area, that are rented or leased for the purposes of storing personal or business items where a majority of the individual storage units are not greater than 750 ft² (70 m²). [5000, 2021]

all of the following apply: (1) the storage units are separated from each other by less than a 1-hour fire resistance rated barrier, (2) the owner of the facility does not have unrestricted access to the storage
A.3.3.196.31.1 Mini-Storage Building.
Mini-storage buildings are typically designed to accommodate relatively small transient tenants who are often private individuals or persons who own small businesses and need additional storage space that is generally very small in area to accommodate their short-term storage needs. This definition is not intended to apply to large warehouse buildings designed to be rented or leased to relatively large multiple tenants who are generally storing their wares in conjunction with their businesses. Garage units that are primarily intended for vehicular storage as part of a multifamily development are not intended to be classified as mini-storage buildings. [5000, 202118]

3.3.227 Quality Assurance.
The procedures conducted by the registered design professionals (RDPs) responsible for design and the registered design professionals responsible for inspection that provide evidence and documentation to the RDPs, the owner, and the AHJ that the work is being constructed in accordance with the approved construction documents. [5000, 202118]

3.3.228 Quality Assurance Program.
A predefined set of observations, special inspections, tests, and other procedures that provide an independent record to the owner, AHJ, and RDP responsible for design that the construction is in general conformance with the approved construction documents. [5000, 202118]

3.3.233 Registered Design Professional (RDP).
An individual who is registered or licensed to practice his/her respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed. [5000, 202118]

3.3.250 *Smoke Barrier.
A continuous membrane, or a membrane with discontinuities created by protected openings, where such membrane is designed and constructed to restrict the movement of smoke. [5000, 202118]

A.3.3.250 Smoke Barrier.
A smoke barrier, such as a wall, floor, or ceiling assembly, might be aligned vertically or horizontally. A smoke barrier might or might not have a fire resistance rating. Application of smoke barrier criteria where required elsewhere in the Code should be in accordance with Section 12.9. [5000, 2021]

3.3.256 Solid Material.
A material that has a melting point, decomposes, or sublimes at a temperature greater than 68°F (20°C). [5000, 202118]

3.3.267 Story.
The portion of a building located between the upper surface of a floor and the upper surface of the floor...
3.3.270 Structural Element.
The columns and girders, beams, trusses, joists, braced frames, moment-resistant frames, and vertical and lateral resisting elements, and other framing members that are designed to carry any portion of the dead or live load and lateral forces, that are essential to the stability of the building or structure. [5000, 202118]

3.4.2.1 Sensitivity Analysis.
An analysis performed to determine the degree to which a predicted output will vary given a specified change in an input parameter, usually in relation to models. [5000, 202118]

3.4.5 *Design Specification.
A building characteristic and other conditions that are under the control of the design team. [5000, 202118]

A.3.4.5 Design Specification.
Design specifications include both hardware and human factors, such as the conditions produced by maintenance and training. For purposes of performance-based design, the design specifications of interest are those that affect the ability of the building to meet the stated goals and objectives. [5000, 202118]

3.4.10 *Fuel Load.
The total quantity of combustible contents of a building, space, or fire area. [5000, 202118]

A.3.4.10 Fuel Load.
Fuel load includes interior finish and trim. [5000, 202118]

4.5.9 Noncombustible Material.

4.5.9.1
A material that complies with any one of the following shall be considered a noncombustible material:

1. The material, in the form in which it is used, and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

2. The material is reported as passing ASTM E136, Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

3. The material is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C.
4.5.10 Limited-Combustible Material.

A material shall be considered a limited-combustible material where both one of the following is met:

1. The conditions of 4.5.10.1 and 4.5.10.2, and the conditions of either 4.5.10.3 or 4.5.10.4, shall be met.
2. The conditions of 4.5.10.5 shall be met.

4.5.10.1 The material does not comply with the requirements for a noncombustible material in accordance with 4.5.9. [5000:7.1.4.2.(1)]

4.5.10.2 The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg) when tested in accordance with NFPA 259. [5000:7.1.4.2.(2)]

4.5.10.3 The material shall have a structural base of a noncombustible material with a surfacing not exceeding a thickness of 1/8 in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, or UL 723, Test for Surface Burning Characteristics of Building Materials. [5000:7.1.4.2.34]

4.5.10.4 The material is composed of materials which, in the form and thickness used, neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723, and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. [5000:7.1.4.2.42]

4.5.10.5 Materials shall be an alternate approach for a material to be considered a limited-combustible material where the material is tested in accordance with ASTM E2965, Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Combustion Consumption Calorimeter, at an incident heat flux of 75 kW/m² for a 20-minute exposure, and both the following conditions are met:

1. The peak heat release rate does not exceed 150 kW/m² for longer than 10 seconds, and
2. The total heat released does not exceed 8 MJ/m².
4.5.10.6
Where the term limited-combustible is used in this Code, it shall also include the term noncombustible.

12.3.2 *Quality Assurance for Penetrations and Joints.
In new buildings three stories or greater in height, a quality assurance program for the installation of devices and systems installed to protect penetrations and joints shall be prepared and monitored by the RDP responsible for design. Inspections of firestop systems and fire-resistive joint systems shall be in accordance with 12.3.2.1 and 12.3.2.2.

12.3.2.1
Inspection of firestop systems of the types tested in accordance with ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Firestop Systems—Steps, or UL 1479, Fire Tests of Through-Penetration Firestops, shall be conducted in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops. [5000:40.9]

12.3.2.2

13.3.2.27 *New Storage Occupancies.

13.3.2.27.5 Bulk Storage of Tires.
Buildings and structures where the volume for the storage of tires exceeds 20,000 ft³ (566 m³) shall be equipped throughout with an approved automatic fire sprinkler system. [5000:30.3.45.2]

13.3.2.27.4 Mini-Storage Building.
An automatic sprinkler system shall be installed throughout all mini-storage buildings greater than 2500 ft² (232 m²) and where any of the individual storage units are separated by less than a 1-hour fire-resistance-rated barrier. [5000:30.3.45.3]

A.18.4.5.3.1
Table A.18.4.5.3.1 provides a comparison of the types of construction for various model building codes. [5000:A.7.2.1.1]
An enclosed area shall be protected by an approved sprinkler system in accordance with Section 13.3, unless such an area is one of the following:

1. Enclosed stadiums, arenas, and similar structures
2. Press boxes of less than 1000 ft² (93 m²)
3. Storage facilities of less than 1000 ft² (93 m²), if enclosed with minimum 1-hour fire-resistance-rated construction
4. Enclosed areas underneath grandstands or bleachers that comply with 16.4.910.5 of NFPA 5000

Portable fire extinguishers shall be installed in assembly occupancies in accordance with Section 13.6, unless otherwise permitted by one of the following:

1. The requirement of 25.1.6.3 shall not apply to seating areas.
2. The requirement of 25.1.6.3 shall not apply to floor areas used for contests, performances, or entertainment.
3. The requirement of 25.1.6.3 shall not apply to outside assembly occupancy areas.
4. Portable extinguishers shall be permitted to be located in secure locations accessible to staff.
60.1.2 Subjects Not Regulated.

Buildings, and portions thereof, containing high-risk contents limited to any of the following shall not be required to comply with this chapter:

1. Flammable and combustible (ignitible) liquids associated with application of flammable finishes and complying with Chapter 43.
2. Flammable and combustible (ignitible) liquids associated with wholesale and retail sales and storage in mercantile occupancies and complying with Chapter 66.
3. Class IIIA and Class IIIB combustible liquid solvents in closed systems employing listed cleaning equipment complying with Chapter 24.
4. Refrigerants and refrigerant oil contained within closed-cycle refrigeration systems complying with Chapter 53 and the building code.
5. Flammable and combustible (ignitible) liquid beverages in liquor stores and distributors without bulk storage.
6. High-risk contents stored or used in farm buildings or similar occupancies for on-premises agricultural use.
7. Corrosive materials in stationary batteries utilized for facility emergency power, uninterrupted power supply, or similar purposes, provided that the batteries are provided with safety venting caps and ventilation is provided in accordance with Chapter 52.
8. Corrosive materials displayed in original packaging in mercantile occupancies and intended for personal or household use or as building materials.
9. Aerosol products in storage or mercantile occupancies and complying with Chapter 61.
10. Flammable and combustible (ignitible) liquids storage tank buildings meeting the requirements of Chapter 24 of NFPA 30.
11. Flammable and combustible (ignitible) liquids storage tank vaults meeting the requirements of Chapter 25 of NFPA 30.
12. Installation of fuel gas distribution systems and associated equipment in accordance with Section 11.4 and Chapter 69.
13. Flammable and combustible (ignitible) liquids process buildings meeting the requirements of Chapter 17 of NFPA 30.
14. Installation of fuel gas distribution systems and associated equipment in accordance with Section 11.4 and Chapter 69.

F.3 References for Extracts in Informational Sections.

MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1498 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
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<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>21 Agree (w/comment: Hanselka, Peterkin)</td>
<td>21 Agree (w/comment, Clary, Hanselka, Peterkin)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible} \div 2 = 15 + 1 = 16\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is **16**.

\[(30 \text{ eligible to vote} - 9 \text{ not returned} - 0 \text{ abstentions} = 21 \times 0.75 = 15.75)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
# NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE
## PROPOSED TIA NO. 1498 BALLOT - FINAL RESULTS

### QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1498 on various 5000 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>21</td>
<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
<td></td>
<td>I agree that NFPA 1 extract should be updated.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Scott M. Bryant</td>
<td></td>
<td>agree</td>
</tr>
<tr>
<td>Sarina L. Hart</td>
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</tr>
<tr>
<td>John A. Sharry</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Robert J. Davidson</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Wade Palazini</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Scott T. Laramee</td>
<td></td>
<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td></td>
<td>The 5000 updates are appropriate</td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td></td>
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</tr>
<tr>
<td>Kelly T. Nicoletto</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Raymond C. O’Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kenneth Earl Tyree, Jr.</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td>Brian L. Olsen</td>
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<td>Agree</td>
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Disagree: 0
Abstain: 0

### QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

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<th>Comments</th>
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<tr>
<td>Not Returned: 9</td>
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<tr>
<td><strong>Agree</strong></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>These extracted text changes should be included with this upcoming edition.</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td>I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.</td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td></td>
<td>The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.</td>
</tr>
<tr>
<td>Catherine L. Stashak</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td>A, B, C and D</td>
<td></td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td>B</td>
<td>The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.</td>
</tr>
<tr>
<td>Carl F. Baldassarri</td>
<td>A</td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kenneth E. Bush</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Scott M. Bryant</td>
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<tr>
<td>Sarina L. Hart</td>
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<tr>
<td>John A. Sharry</td>
<td>A &amp; B</td>
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<td>A and B</td>
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<td>The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
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<td>Kelly T. Nicolello</td>
<td>Agree</td>
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<td>Raymond C. O’Brocki</td>
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<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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Kenneth Earl Tyree, Jr.

A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen

B.

Scott T. Laramee

I agree

Disagree 0

Abstain 0
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: April 21, 2020

SUBJECT: NFPA 1 Proposed Tentative Interim Amendment (TIA) No. 1499

The attached proposed Tentative Interim Amendment (TIA) Log No. 1499 is being submitted to you for ballot on various Extract Updates. This proposed TIA was submitted by Kenneth Bush of the Maryland State Fire Marshals Office and endorsed by Catherine Stashak of the Office of the Illinois State Fire Marshal.

This proposed TIA will be published for public comment in the May 2020 issue of NFPA News with a Public Comment Closing Date of June 17, 2020. Any public comments received will be circulated to the committee. Finally, the Standards Council will review and consider the issuance of this TIA.

In accordance with Section 5 of the Regulations Governing the Development of NFPA Standards, you are being balloted on the technical merits of the proposed TIA and whether this matter is of an emergency nature.

The ballot can now be accessed through the NFPA online ballot system at the following link: NFPA Ballot Link. The link will bring you to your profile page and once you sign in, select the My Committees tab and click on the blue Vote button which will direct you to the ballot site.

Please complete the ballot on or before, Tuesday, May 5, 2020, 11:59 pm ET.

While completing your ballot, please remember the following:

- **A comment is required for both Question No. 1 and Question No. 2 for the online TIA ballot. Comments must accompany all Negative, Abstaining and Agree votes.**

- **If you vote “Agree” on Question 1, simply add “Agree” to the comment field and if you vote “Agree” on Question 2, insert the applicable letter(s) selections in the comment field which can be found in the Instructions box on the ballot site.**

You must hit SUBMIT to SAVE your work. Note: the system session will time you out after 60 minutes; any work not submitted at that time will not be saved! You may return to finish or change your ballot at any time up to the closing date. Ballot comments exceeding 4,000 characters must be submitted in a Word document via email, to Kelly Carey at kcarey@nfpa.org.

Note: Please remember that the return of ballots and attendance at committee meetings are required in accordance with the Regulations Governing the Development of NFPA Standards.
Substantiation: The current text of NFPA 1 contains extracts from the last published edition of NFPA 30 but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 30 in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.
2.3.3 API Publications.


2.3.6 ASME Publications.


2.3.7 ASTM Publications.


2.3.18 UL Publications.

UL 142A, Safety for Special Purpose Aboveground Tanks for Specific Flammable or Combustible Liquids, 2018.
UL 2258, Aboveground Nonmetallic Tanks for Fuel Oil and Other Combustible Liquids, 2018

2.4 References for Extracts in Mandatory Sections.


3.3.14.3 Fire Area.

An area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hour and having all communicating openings properly protected by an assembly having a fire resistance rating of at least 1 hour. [30, 202118]

3.3.14.6 Inside Liquid Storage Area.

A room or building used for the storage of liquids in containers or portable tanks, separated from other types of occupancies. [30, 202118]

3.3.21 Barrel.

A unit of volume used in the petroleum industry that is equal to 42 gal (159 L). [30, 202118]

3.3.27 *Boiling Point.

The temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure. [30, 202118]

A.3.3.27 Boiling Point (BP).

At the boiling point, the surrounding atmospheric pressure can no longer hold the liquid in the liquid state and the liquid boils. A low boiling point is indicative of a high vapor pressure and a high rate of
3.3.28 *Boil-Over.
An event in the burning of certain oils in an open-top tank when, after a long period of quiescent burning, there is a sudden increase in fire intensity associated with expulsion of burning oil from the tank. [30, 202118]

A.3.3.28 Boil-Over.
Boil-over occurs when the residues from surface burning become more dense than the unburned oil and sink below the surface to form a hot layer, which progresses downward much faster than the regression of the liquid surface. When this hot layer, called a “heat wave,” reaches water or water-in-oil emulsion in the bottom of the tank, the water is first superheated and then boils almost explosively, overflowing the tank. Oils subject to boil-over consist of components having a wide range of boiling points, including both light ends and viscous residues. These characteristics are present in most crude oils and can be produced in synthetic mixtures. [30A, 202118]

A boil-over is an entirely different phenomenon from a slop-over or froth-over. Slop-over involves a minor frothing that occurs when water is sprayed onto the hot surface of a burning oil. Froth-over is not associated with a fire but results when water is present or enters a tank containing hot viscous oil. Upon mixing, the sudden conversion of water to steam causes a portion of the tank contents to overflow. [30, 202118]

3.3.29.7 *Important Building.
A building that is considered not expendable in an exposure fire. [30, 202118]

A.3.3.29.7 Important Building.
Examples of important buildings include occupied buildings where egress within 2 minutes cannot be reasonably expected, and control buildings that require presence of personnel for orderly shutdown of important or hazardous processes. Important buildings can also include unprotected storage where products from fire can harm the community or the environment or buildings that contain high-value contents or critical equipment or supplies. [30, 202118]

3.3.29.11 Storage Tank Building.
A three-dimensional space that is enclosed by a roof and walls that cover more than one-half of the possible area of the sides of the space, is of sufficient size to allow entry by personnel, will likely limit the dissipation of heat or dispersion of vapors, and restricts access for fire fighting. [30, 202118]

3.3.47 Chemical Plant.
A large integrated plant or that portion of such a plant, other than a refinery or distillery, where liquids are produced by chemical reactions or used in chemical reactions. [30, 202118]

3.3.54 Closed-Top Diking.
A dike with a cover intended to minimize the entrance of precipitation into the diked area. [30, 20]

3.3.72.4 Container (Flammable or Combustible Liquid).
Any vessel of 119 gal (450 L) or less capacity used for transporting or storing liquids, excluding intermediate bulk containers. [30, 20]

A.3.3.72.4 Container (Flammable or Combustible Liquid).
The U.S. DOT defines non-bulk packaging as having up to 119 gal (450 L) capacity in 49 CFR 171.8. [30, 20]

3.3.72.4.1 Closed Container.
A container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures. [30, 20]

3.3.72.6 Intermediate Bulk Container.
Any closed vessel having a liquid capacity not exceeding 3000 L (793 gal) and intended for storing and transporting liquids, as defined in Title 49, Code of Federal Regulations, Parts 100 through 199 or in Part 6 of the United Nations’ Recommendations on the Transport of Dangerous Goods. [30, 20]

3.3.79 Crude Petroleum.
Hydrocarbon mixtures that have a flash point below 150°F (65.6°C) and that have not been processed in a refinery. [30, 20]

3.3.85 Damage-Limiting Construction.
For the purposes of this code, any set of construction elements, used individually or in combination, which will act to limit damage from an explosion, including open structures, pressure relieving construction, or pressure resistant construction. [30, 20]

3.3.93 Distillery.
A plant or that portion of a plant where liquids produced by fermentation are concentrated and where the concentrated products are also mixed, stored, or packaged. [30, 20]

3.3.101 Emergency Relief Vent.
An opening, construction method, or device that will automatically relieve excessive internal pressure due to an exposure fire. [30, 20]

3.3.133 Fire Point.
The lowest temperature at which a liquid will ignite and achieve sustained burning when exposed to a test flame in accordance with ASTM D92, Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester. [30, 20]
3.3.140 Flash Point *(FP).*

The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitible mixture with the air, near the surface of the liquid or within the vessel used, as determined by the appropriate test procedure and apparatus specified in Section 4.4 of NFPA 30. [30, 2021]8

A.3.3.140 Flash Point.

Flash point is a direct measure of a liquid’s ability to emit flammable vapors. The lower the flash point, the greater the risk of fire. Flash point is determined using one of several different test procedures and apparatus that are specified in Section 4.4 of NFPA 30. [30, 2018]

A liquid that has a flash point at or below ambient temperature is easy to ignite and will burn quickly. On ignition, the spread of flame over the surface of such a liquid will be rapid, because it is not necessary for the fire to expend energy heating the liquid to generate more vapor. Gasoline is a familiar example. A liquid with a flash point above ambient temperature presents less risk because it must be heated to generate enough vapor to become ignitible; it is more difficult to ignite and presents less potential for the generation and spread of vapor. A common example is home heating oil (Fuel Oil No. 2). Home heating oil must be atomized to a fine mist in order for it to be easily ignited. [30, 2018]

Certain solutions of liquids in water exhibit a flash point using the standard closed-cup test procedures but will not burn and could even extinguish a fire. To assist identifying such solutions, the following standards are helpful:

(1) ASTM D4207, Standard Test Method for Sustained Burning of Low Viscosity Liquid Mixtures by the Wick Test
(2) ASTM D4206, Standard Test Method for Sustained Burning of Liquid Mixtures Using the Small Scale Open-Cup Apparatus
[30, 2018]

Liquid mixtures that do not sustain combustion for a specified time at a specified temperature are considered to be noncombustible. The tests described in the references listed in A.3.3.140(1) and A.3.3.140(2) provide additional data for determining proper storage and handling of such mixtures. In a confined space, such mixtures could still create an ignitible vapor–air mixture, depending on the amount of flammable liquid in the mixture and the quantity of the spill. [30, 2018]

Related to the flash point is the fire point. The fire point of a liquid is the temperature at which ignition of vapors will result in continued burning. As the term flash point suggests, the vapors generated at that temperature will flash but will not necessarily continue to burn. The difference between flash point and fire point has some significance when conducting flash point tests [see 9.1.4(5) and 9.1.4(6) of NFPA 30]. However, a closed-cup flash point is used to classify the liquid and characterize its hazard. [30, 2018]

For more information, see ASTM E502, Standard Test Method for Selection and Use of ASTM Standards for the Determination of Flash Point of Chemicals by Closed Cup Methods, and the ASTM Manual on Flash Point Standards and Their Use. [30, 2018]

3.3.143 Fugitive Emissions.
Releases of flammable vapor that continuously or intermittently occur from process equipment during normal operations. [30, 202118]

A.3.3.143 Fugitive Emissions.
These include leaks from pump seals, valve packing, flange gaskets, compressor seals, process drains, and so forth. [30, 202118]

3.3.146.7 Liquefied Gas.
A gas, other than in solution, that in a packaging under the charged pressure exists both as a liquid and a gas at a temperature of 68°F (20°C). [30, 202118]

3.3.158 Hazardous Materials Storage Locker.
A movable prefabricated structure, manufactured primarily at a site other than the final location of the structure and transported completely assembled or in a ready-to-assemble package to the final location, and intended to meet local, state, and federal requirements for outside storage of hazardous materials. [30, 202118]

3.3.159 *Hazardous Reaction or Hazardous Chemical Reaction.
Reactions that result in dangers beyond the fire problems relating to flash point and boiling point of either the reactants or of the products. [30, 202118]

A.3.3.159 Hazardous Reaction or Hazardous Chemical Reaction.
These dangers might include, but are not limited to, toxic effects, reaction speed (including detonation), exothermic reaction, or production of unstable or reactive materials. [30, 202118]

3.3.160 Heat Transfer Fluid (HTF).
A liquid that is used as a medium to transfer heat energy from a heater or vaporizer to a remote heat consumer (e.g., injection molding machine, oven, or dryer, or jacketed chemical reactor). [30, 202118]

3.3.169 Incidental Liquid Use or Storage.
Use or storage as a subordinate activity to that which establishes the occupancy or area classification. [30, 202118]

3.3.178.1 Combustible Liquid.
An ignitible liquid that is classified as a Class II or Class III liquid. (See 4.2.2 and 4.2.3 of NFPA 30.) Any liquid that has a closed-cup flash point at or above 100°F (37.8°C), as determined by the test procedures and apparatus set forth in Section 4.4 of NFPA 30. Combustible liquids are classified according to Section 4.3 of NFPA 30. [30, 202118]

3.3.178.2 *Flammable Liquid.
An ignitible liquid that is classified as a Class I liquid. (See 4.2.1 of NFPA 30.) Any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth in
Section 4.4 of NFPA 30 and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D323, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method). Flammable liquids are classified according to Section 4.3 of NFPA 30. [30, 2021]

**A.3.3.178.2 Flammable Liquid.**
For the purposes of this Code, a material with a Reid vapor pressure greater than an absolute pressure of 40 psi (276 kPa) is considered to be a gas and is, therefore, not within the scope of NFPA 30. See NFPA 58. [30, 2021]

**3.3.34.4 Liquid Class.**
A uniform system of classifying ignitible liquids. *(See 66.4 and Chapter 4 of NFPA 30.)*

**3.3.178.4* Ignitible Liquid.**
Any liquid or liquid mixture that has a measurable fire point. [30, 2021]

**A.3.3.178.4 Ignitible Liquid.**
Unless otherwise specified, the term liquid means an ignitible liquid. [30, 2021]

The term ignitible liquid refers to any liquid that will burn. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitible liquids. [30, 2021]

**3.3.178.45 Stable Liquid.**
Any liquid not defined as unstable. [30, 2021]

**3.3.203 *Operating Unit (Vessel) or Process Unit (Vessel).**
The equipment in which a unit operation or unit process is conducted. *(See also 3.3.289, Unit Operation or Unit Process.)* [30, 2021]

**A.3.3.203 Operating Unit (Vessel) or Process Unit (Vessel).**
Unit operations include, but are not limited to, distillation, oxidation, cracking, and polymerization. [30, 2021]

**3.3.204 Operations.**
A general term that includes, but is not limited to, the use, transfer, storage, and processing of liquids. [30, 2021]

**3.3.224 *Process or Processing.**
An integrated sequence of operations. [30, 2021]
A.3.3.224 Process or Processing.
The sequence can include both physical and chemical operations, unless the term is modified to restrict it to one or the other. The sequence can involve, but is not limited to, preparation, separation, purification, or change in state, energy content, or composition. [30, 2021]

3.3.227 Protection for Exposures.
Fire protection for structures on property adjacent to liquid storage that is provided by (1) a public fire department or (2) a private fire brigade maintained on the property adjacent to the liquid storage, either of which is capable of providing cooling water streams to protect the property adjacent to the liquid storage. [30, 2021]

3.3.236 Refinery.
A plant in which flammable or combustible (ignitible) liquids are produced on a commercial scale from crude petroleum, natural gasoline, or other hydrocarbon sources. [30, 2021]

3.3.244 *Safety Can.
A listed container of not more than 5.3 gal (20 L) capacity having a screen or strainer in each fill and pour opening, and having a spring-closing lid and spout cover, designed to safely relieve internal pressure when exposed to fire. [30, 2021]

A.3.3.244 Safety Can.
Safety cans listed to UL 30, Metal Safety Cans, are limited to 5 U.S. gal (19 L). UL 1313, Nonmetallic Safety Cans for Petroleum Products, allows for capacities up to 5 Imperial gal (23 L). [30, 2021]

3.3.278.15 *Vapor Processing System.
A system designed to capture and process vapors displaced during transfer or filling operations by use of mechanical or chemical means. [30, 2021]

A.3.3.278.15 Vapor Processing System.
Examples are systems using blower-assist for capturing vapors and refrigeration, absorption, and combustion systems for processing vapors. [30, 2021]

3.3.278.16 *Vapor Recovery System.
A system designed to capture and retain, without processing, vapors displaced during transfer or filling operations. [30, 2021]

A.3.3.278.16 Vapor Recovery System.
Examples are balanced-pressure vapor displacement systems and vacuum-assist systems without vapor processing. [30, 2021]

3.3.279.2 Aboveground Tank.
A storage tank that is installed above grade, at grade, or below grade without backfill. [30, 2021]
3.3.279.2.1 Protected Aboveground Tank.
An atmospheric aboveground storage tank with integral secondary containment and thermal insulation that has been evaluated for resistance to physical damage and for limiting the heat transferred to the primary tank when exposed to a hydrocarbon pool fire and is listed in accordance with UL 2085, Protected Aboveground Tanks for Flammable and Combustible Liquids, or an equivalent test procedure. [30:22.2.3]

3.3.279.4 *Portable Tank.
Any vessel having a liquid capacity over 60 gal (230 L) intended for storing liquids and not intended for fixed installation. [30, 20218]

A.3.3.279.4 Portable Tank.
A portable tank does not include any cylinder having less than 1000 lb (453.5 kg) water capacity, cargo tank, tank car tank, or trailers carrying cylinders of over 1000 lb (453.5 kg) water capacity. [55,2020]

3.3.279.5 Secondary Containment Tank.
A tank that has an inner and outer wall with an interstitial space (annulus) between the walls and that has a means for monitoring the interstitial space for a leak. [30, 20218]

3.3.279.7 Storage Tank.
Any vessel having a liquid capacity that exceeds 60 gal (230 L), is intended for fixed installation, and is not used for processing. [30, 20218]

3.3.289 Unit Operation or Unit Process.
A segment of a physical or chemical process that might or might not be integrated with other segments to constitute the manufacturing sequence. [30, 20218]

3.3.296 *Vapor Pressure.
The pressure, measured in pounds per square inch, absolute (psia), exerted by a liquid, as determined by ASTM D323, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method). [30, 20218]

A.3.3.296 Vapor Pressure.
Vapor pressure is a measure of the pressure that the liquid exerts against the atmosphere above it. Just as the atmosphere exerts pressure on the surface of the liquid, the liquid pushes back. Vapor pressure is normally less than atmospheric pressure and is a measure of the liquid's tendency to evaporate (i.e., to move from the liquid to the gaseous state). This tendency is also referred to as volatility, thus the use of the term volatile to describe liquids that evaporate very easily. The higher the vapor pressure, the greater the rate of evaporation and the lower the boiling point. Simply put, this means more vapors and increased fire risk. [30:A.4.2.6]
3.3.300.1 **General-Purpose Warehouse.**
A separate, detached building or portion of a building used only for warehousing-type operations and classified as a "storage — low hazard" or "storage — ordinary hazard" occupancy by the building code and by NFPA 101. [30, 2011]

3.3.300.2 **Liquid Warehouse.**
A separate, detached building or an attached building that is used for warehousing-type operations for liquids and whose exterior wall comprises at least 25 percent of the building perimeter. [30, 2011]

42.3.3.2.4 **Storage Tank Selection and Arrangement.**

42.3.3.2.6.1
Vaults that contain tanks storing Class I liquids [FP < 100°F (37.8°C)] shall be ventilated at a rate of not less than 1 cfm/ft² of floor area (0.3 m³/min/m²), but not less than 150 cfm (4 m³/min). [30:25.10.1]

42.3.3.2.7 **Detection and Alarm Systems for Storage Tank Vaults**

42.3.3.2.7.6
Activation of either the vapor detection system or the liquid detection system shall cause a signal to be sounded at an approved, constantly attended location within the facility serving the tanks or at an approved location. [30:25.15.6]

42.3.3.2.8 **Location of Storage Tank Vaults.**
In lieu of the separation distance requirements given in 66.22.4, separation distances between the vault and any of the following shall be permitted to be reduced to 0 ft (0 m), as measured from the outer perimeter of the vault wall:

1. Any property line that is or can be built upon
2. The near and far sides of a public way
3. The nearest important building on the same property

[30:25.4]

42.3.3.2.9 **Inspection and Maintenance of Storage Tank Vaults and Equipment.**
Vaults and their required equipment shall be maintained in accordance with the requirements of Chapter 25 of NFPA 30. [30:25.16]

42.3.3.4 **Additional Requirements for Protected Aboveground Storage Tanks.**

42.3.3.4.1 **Protected Tanks.**
Protected aboveground tanks shall be tested and listed in accordance with UL 2085, *Protected Aboveground Tanks for Flammable and Combustible Liquids.* [30:22.10.1]
Protected aboveground tanks shall also meet both of the following requirements:

1. The construction that provides the required fire-resistive protection shall reduce the heat transferred to the primary tank in order to limit the temperature of the primary tank to an average maximum rise of 260°F (144°C) and a single point maximum rise of 400°F (204°C) and to prevent release of ignitable (flammable or combustible) liquid, failure of the primary tank, failure of the supporting structure, and impairment of venting for a period of not less than 2 hours when tested using the fire exposure specified in UL 2085, *Protected Aboveground Tanks for Flammable and Combustible Liquids*.

2. Reduction in sizing of the emergency vents in accordance with 22.7.3.5 of NFPA 30 shall not be permitted.

\[30:22.10.2\]

### 42.10.3.1.3.10.2

Joints [and flanges] shall be designed and installed so that the mechanical strength of the joint will not be impaired if exposed to a fire. \[30:27.5.1.2\]

### 43.1.6.2 Storage in Process Areas—General Occupancy Limits

The maximum allowable quantities (MAQs) of ignitable (flammable or combustible) liquids allowed in each control area shall not exceed the amounts specified in Table 43.1.6.2. \[30:9.6.1\], with additional quantities allowed in accordance with the requirements established in 43.1.6.3. \[33:8.2\]

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\d See 66.4.1 for details on the classification scheme.

Notes:

1. Quantities are permitted to be increased 100 percent where all liquids are stored in approved flammable liquids storage cabinets or in safety cans in accordance with the fire code. Where Note 2 also applies, the increase for both notes is permitted to be applied accumulatively.

2. Quantities are permitted to be increased 100 percent in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13. Where Note 1 also applies, the increase for both notes is permitted to be applied accumulatively.

3. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB, or Class IC [FP < 100°F (37.8°C)] flammable liquids, individually.
(4) Quantities are not limited in a building equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13 and designed in accordance with the protection criteria contained in 66.16.  
Exception: As modified by 9.6.2 and Chapters 10 through 14 of NFPA 30. [30:Table 9.6.1]

43.1.8.8.1.1  
Paragraph 43.1.8.8 shall apply to solvent distillation units having distillation chambers or still pots that do not exceed 60 gal (22730 L) nominal capacity and are used to recycle Class I, Class II, and/or Class IIIA liquids [FP < 200°F (93°C)]. [30:19.6.1.1]

43.1.8.8.5 Liquid Storage.  
Distilled liquids and liquids awaiting distillation shall be stored in accordance with Chapter 6 of NFPA 30. [3330:10.8.519.6.5]

63.3.1.18 Installation of Underground Piping.  
63.3.1.18.6  
In paved areas where a minimum 4 in. (100 mm) of reinforced concrete is used, backfill between the pipe and the concrete asphalt shall be permitted to be reduced to 4 in. (100 mm) minimum. [30:27.6.5.4]

63.3.1.18.9  
Piping within the same trench shall be separated horizontally by at least two pipe diameters. Separation shall not need to exceed 9 in. (230 mm). [30:27.6.5.7]

66.1.3  
This chapter shall not apply to the following:

1. Any liquid that has a melting point of 100°F (37.8°C) or greater
2. Any liquid that does not meet the criteria for fluidity given in the definition of liquid in 3.3.30 of NFPA 30 and in the provisions of Chapter 4 of NFPA 30
3. Any cryogenic fluid or liquefied gas, as defined in 3.3.146.7
4. Any liquid that does not have a flash point, but which is capable of burning under certain conditions
5. Any aerosol product
6. Any mist, spray, or foam
7. Transportation of ignitable (flammable or combustible) liquids as governed by the U.S. Department of Transportation
8. Storage, handling, and use of fuel oil tanks and containers connected with oil-burning equipment
9. Use and installation of alcohol-based hand rub (ABHR) dispensers. (See 60.5.2.)
10. Liquids in the fuel tanks of motor vehicles, aircraft, boats, or portable or stationary engines
Liquids that have no fire point when tested in accordance with ASTM D92, *Flash and Fire Points by Cleveland Open Cup Tester*, up to the boiling point of the liquid or up to a temperature at which the liquid shows an obvious physical change.

Liquids with a flash point greater than 95°F (35°C) in a water-miscible solution or water-miscible dispersion with a water and noncombustible solids content of more than 80 percent by weight, and which does not sustain combustion when tested in accordance with “Method of Testing for Sustained Combustibility,” in accordance with 49 CFR 173, Appendix H, or the UN publication, *Recommendations on the Transport of Dangerous Goods*.

A.66.1.3(1)
Liquids that are solid at 100°F (37.8°C) or above, but are handled, used, or stored at temperatures above their flash points FP, should be reviewed against pertinent sections of this Code. [30:A.1.1.2(1)]

A.66.1.3(4)
Certain mixtures of flammable or combustible (ignitable) liquids and halogenated hydrocarbons either do not exhibit a flash point FP using the standard closed-cup test methods or will exhibit elevated flash points FP. However, if the halogenated hydrocarbon is the more volatile component, preferential evaporation of this component can result in a liquid that does have a flash point FP or has a FP flash point that is lower than the original mixture. In order to evaluate the fire hazard of such mixtures, FP flash point tests should be conducted after fractional evaporation of 10, 20, 40, 60, or even 90 percent of the original sample or other fractions representative of the conditions of use. For systems such as open process tanks or spills in open air, an open-cup test method might be more appropriate for estimating the fire hazard. [30:A.1.1.2(4)]

A.66.1.3(7)
Requirements for transportation of flammable and combustible (ignitable) liquids can be found in NFPA 385 and in the U.S. Department of Transportation's Hazardous Materials Regulations, Title 49, Code of Federal Regulations, Parts 100–199. [30:A.1.1.2(7)]

66.1.4
Installations made in accordance with the applicable requirements of the following standards shall be deemed to be in compliance with this Code:

1. NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*
2. NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*
3. NFPA 31, *Standard for the Installation of Oil-Burning Equipment*
4. NFPA 32, *Standard for Drycleaning Plants*
5. NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*
6. NFPA 34, *Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids*
8. NFPA 36, *Standard for Solvent-Extraction Plants*
9. NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*
66.3.3.10 Container.
Any vessel of 119 gal (450 L) or less capacity used for transporting or storing liquids, excluding intermediate bulk containers. [30, 202118]

66.3.3.11 Control Area.
For the purposes of this chapter, a building or portion of a building within which flammable and combustible liquids are allowed to be stored, dispensed, and used or handled in quantities that do not exceed the maximum allowable quantity (MAQ). [30, 202118]

66.3.3.19 Hazardous Material or Hazardous Chemical.
Material presenting dangers beyond the fire problems relating to flash point and boiling point. [30, 202118]

A.66.3.3.19 Hazardous Material or Hazardous Chemical.
These dangers can arise from, but are not limited to, toxicity, reactivity, instability, or corrosivity. [30, 202118]

66.3.3.23 High-Hazard Level 2 Contents.
Contents that present a deflagration hazard or a hazard from accelerated burning, which, for this chapter, includes. For the purposes of this chapter, this includes Class I, Class II, or Class IIIA liquids [FP < 200°F (93°C)] that are used or stored in normally open containers or systems, or in closed containers or systems at gauge pressures 15 psi (103 kPa) or greater. [30, 202118]

66.3.3.24 High-Hazard Level 3 Contents.
Contents that readily support combustion or that present a physical hazard, which, for this chapter, includes Class I, Class II, or Class IIIA liquids [FP < 200°F (93°C)] that are used or stored in normally closed containers or in closed systems at gauge pressures of less than 15 psi (103 kPa). [30, 202118]

66.3.3.33.2 Low-Pressure Tank.
For the purposes of this chapter, a storage tank designed to withstand an internal pressure above a gauge pressure of 1.0 psig (6.9 kPa) but not more than a gauge pressure of 15 psi (103 kPa) measured at the top of the tank. [30, 202118]

66.3.3.33.3.1 Nonmetallic Portable Tank.
A portable tank, as herein defined, constructed of plastic, fiber, or a material other than metal. [30,
A.66.3.3.3 Nonmetallic Portable Tank.
Permissible nonmetallic portable tanks for shipping Class I, Class II, or Class IIIA liquids \([\text{FP} < 200°F (93°C) \text{ and any BP}]\) are governed by hazardous materials transportation regulations promulgated by the United Nations (UN) and the U.S. Department of Transportation (DOT). Small tanks for Class IIIB liquids \([\text{FP} \geq 200°F (93°C)]\) are not governed by either UN or DOT hazardous materials regulations. Fiber portable tanks for Class IIIB liquids \([\text{FP} \geq 200°F (93°C)]\) include composite designs consisting of a multi-ply corrugated box with a rigid or flexible inner plastic bladder. [30, 202118]

66.3.3.36 Vapor Processing Equipment.
Those components of a vapor processing system designed to process vapors or liquids captured during transfer or filling operations. [30, 202118]

66.3.3.40 *Warehouse.

A.66.3.3.40
Warehouse.
Warehousing operations referred to in these definitions are those operations not accessible to the public and include general-purpose, merchandise, distribution, and industrial warehouse–type operations. [30, 202118]

66.4 Definition and Classification of Liquids.

66.4.1 Definitions Specific to Liquids.
For the purposes of this chapter, the terms in this subsection shall have the definitions given. [30:4.2]

66.4.1.1* Boiling Point.
See 3.3.27.

A.66.4.1.1
See A.3.3.27.

66.4.1.2 Combustible Liquid.
See 3.3.178.1.

66.4.1.3 Flammable Liquid.
See 3.3.178.2.

66.4.1.4* Flash Point.
See 3.3.140.
66.4.1.4
See A.3.3.140

66.4.1.5 Liquid.
See 3.3.172.

66.4.1.6* Vapor Pressure.
See 3.3.296.

A.66.4.1.6
See A.3.3.296

66.4.2 Classification of Liquids Scheme.

66.4.1.1 Class I Liquids.

66.4.1.1.1 A liquid with a closed-cup flash point below 100°F (37.8°C) shall be designated as a Class I liquid (i.e., flammable liquid), as determined by the test procedures and apparatus set forth in Section 4.4 and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D323, Vapor Pressure of Petroleum Products (Reid Method). [30:4.2.1.1]

66.4.1.1.2 Class I liquids shall be further subclassified in accordance with the following:

(1) Class IA Liquid. A liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C).

(2) Class IB Liquid. A liquid that has a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C).

(3) Class IC Liquid. A liquid that has a flash point at or above 73°F (22.8°C), but below 100°F (37.8°C). [30:4.2.1.2]

66.4.1.2 Class II Liquids.
A liquid with a closed-cup flash point at or above 100°F (37.8°C) but below 140°F (60°C) shall be designated as a Class II liquid (i.e., combustible liquid), as determined by the test procedures and apparatus set forth in 66.4.3. [30:4.2.2]

66.4.1.3 Class III Liquids.

66.4.1.3.1
A liquid with a closed-cup flash point at or above 140°F (60°C) shall be designated as a Class III liquid (i.e., combustible liquid), as determined by the test procedures and apparatus set forth in 66.4.3.

66.4.1.3.2
Class III liquids shall be further subclassified in accordance with the following:

1. **Class IIIA Liquid.** A liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C).
2. **Class IIIB Liquid.** A liquid that has a flash point at or above 200°F (93°C).

Any liquid within the scope of this chapter and subject to the requirements of this chapter shall be classified in accordance with this subsection.

A.66.4.2
The classification of liquids is based on flash points that have been corrected to sea level, in accordance with the relevant ASTM test procedures. At high altitudes, the actual flash points will be significantly lower than those either observed at sea level or corrected to atmospheric pressure at sea level. Allowances could be necessary for this difference in order to appropriately assess the risk.

Table A.66.4.2 presents a comparison of the definitions and classification of flammable and combustible liquids, as set forth in Chapter 66 of this Code, with similar definitions and classification systems used by other regulatory bodies.

The Hazardous Materials Regulations of the U.S. Department of Transportation (DOT), as set forth in the 49 CFR 173.120(b)(2) and 173.150(f), provide an exception whereby a flammable liquid that has a flash point between 37.8°C (100°F) and 60.5°C (141°F) and does not also meet the definition of any other DOT hazard class can be reclassified as a combustible liquid (i.e., one having a flash point above 60.5°C (141°F)) for shipment by road or rail within the United States.

<table>
<thead>
<tr>
<th>Agency</th>
<th>NFPA Flash Point °F</th>
<th>NFPA Flash Point °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI-Z129.1</td>
<td>&lt;141</td>
<td>&lt;60.5</td>
</tr>
<tr>
<td></td>
<td>Flammable</td>
<td>-Class-I</td>
</tr>
<tr>
<td></td>
<td>100 to &lt;140</td>
<td>37.8 to &lt;60</td>
</tr>
<tr>
<td></td>
<td>Combustible</td>
<td>-Class-II</td>
</tr>
<tr>
<td></td>
<td>140 to &lt;200</td>
<td>60 to &lt;93</td>
</tr>
<tr>
<td></td>
<td>-Class-III</td>
<td></td>
</tr>
</tbody>
</table>

Table A.66.4.2 Comparative Classification of Liquids
### Table of Flammable and Combustible Liquids

<table>
<thead>
<tr>
<th>DOT</th>
<th>Flammable</th>
<th>Combustible</th>
<th>Combustible</th>
<th>Combustible Class IIIA</th>
<th>Combustible Class II</th>
<th>Combustible Class IIIA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;141</td>
<td>≥141 to &lt;200</td>
<td>≥60.5 to &lt;93</td>
<td>&gt;140 to &lt;200</td>
<td>≥140 to &lt;200</td>
<td>≥60 to &lt;93</td>
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<tr>
<td>DOTHM-181 Domestic Exemption*</td>
<td>Flammable</td>
<td>Combustible</td>
<td>Combustible</td>
<td>Combustible Class IIIA</td>
<td>Combustible Class II</td>
<td>Combustible Class IIIA</td>
</tr>
<tr>
<td></td>
<td>&lt;100</td>
<td>≥100 to &lt;140</td>
<td>≥37.8 to &lt;93</td>
<td>&gt;140 to &lt;200</td>
<td>≥37.8 to &lt;200</td>
<td>≥60 to &lt;93</td>
</tr>
<tr>
<td>UN</td>
<td>Flammable</td>
<td>Combustible</td>
<td>Combustible</td>
<td>Combustible Class IIIA</td>
<td>Combustible Class II</td>
<td>Combustible Class IIIA</td>
</tr>
<tr>
<td></td>
<td>&lt;100</td>
<td>≥100 to &lt;140</td>
<td>≥37.8 to &lt;93</td>
<td>&gt;140 to &lt;200</td>
<td>≥37.8 to &lt;200</td>
<td>≥60 to &lt;93</td>
</tr>
<tr>
<td></td>
<td>Combustible</td>
<td>≥60.5 to &lt;93</td>
<td>Combustible</td>
<td>Combustible Class IIIA</td>
<td>Combustible Class II</td>
<td>Combustible Class IIIA</td>
</tr>
<tr>
<td></td>
<td>≥141 to &lt;200</td>
<td>≥100 to &lt;140</td>
<td>&gt;140 to &lt;200</td>
<td>≥37.8 to &lt;200</td>
<td>≥60 to &lt;93</td>
<td></td>
</tr>
<tr>
<td>OSHA</td>
<td>Flammable</td>
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<td>≥37.8</td>
<td>Combustible Class I</td>
<td>≥100</td>
<td>≥37.8</td>
</tr>
<tr>
<td></td>
<td>Combustible †</td>
<td>≥100</td>
<td>≥37.8</td>
<td>Combustible Class II</td>
<td>≥100</td>
<td>≥37.8</td>
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<tr>
<td></td>
<td>Combustible †</td>
<td>≥100</td>
<td>≥37.8</td>
<td>Combustible Class II</td>
<td>≥100</td>
<td>≥37.8</td>
</tr>
</tbody>
</table>

*See A.66.4.3.
†See 29 CFR 1910.106 for Class IIIIB liquid exemptions. [30: Table A.4.3]
Flammable liquids, as defined in 3.3.178.2 and 66.4.1.3, shall be classified as Class I liquids and shall be further subclassified in accordance with the following:

1. **Class IA Liquid** — Any liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C)

2. **Class IB Liquid** — Any liquid that has a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C)

3. **Class IC Liquid** — Any liquid that has a flash point at or above 73°F (22.8°C), but below 100°F (37.8°C)

Combustible liquids, as defined in 3.3.178.1 and 66.4.1.2, shall be classified in accordance with the following:

1. **Class II Liquid** — Any liquid that has a flash point at or above 100°F (37.8°C) and below 140°F (60°C)

2. **Class III Liquid** — Any liquid that has a flash point at or above 140°F (60°C)
   - (a) **Class IIIA Liquid** — Any liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C)
   - (b) **Class IIIB Liquid** — Any liquid that has a flash point at or above 200°F (93°C)

**66.4.2 Determination of Boiling Point (BP).**

**66.4.2.1**
For defining the boiling point, atmospheric pressure shall be considered to be an absolute pressure of 14.7 psi (101.4 kPa). [30:4.3.1]

**66.4.2.2**
For mixtures that do not have a constant boiling point, the 20 percent evaporated point of a distillation performed in accordance with ASTM D86, Distillation of Petroleum Products at Atmospheric Pressure, shall be considered to be the boiling point. [30:4.3.2]

**66.4.3 Determination of Flash Point (FP).**
The flash point of a liquid shall be determined according to the methods specified in 66.4.3.1 through 66.4.3.4. [30:4.4]

**66.4.3.1.1**
Cut-back asphalts, liquids that tend to form a surface film, and liquids that contain suspended solids shall not be tested in accordance with ASTM D56, *Standard Test Method for Flash Point by Tag Closed Cup* Tester, even if they otherwise meet the viscosity criteria. [30:4.4.1.1]
66.4.3.2
Such liquids as stated in 66.4.3.1 shall be tested in accordance with 66.4.3.2.

66.4.3.3
As an alternative, ASTM D3278, Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus, shall be permitted to be used for paints, enamels, lacquers, varnishes, and related products and their components that have flash points between 32°F (0°C) and 230°F (110°C) and viscosities below 150 centistokes at 77°F (25°C).

66.6.1 *Scope.
This subsection shall apply to the hazards associated with storage, processing, handling, and use of ignitible (flammable or combustible) liquids. This subsection shall also apply when specifically referenced by another section.

66.6.3 *Management of Fire and Explosion Hazards.
This subsection shall apply to the management methodology used to identify, evaluate, and control the hazards involved in the processing and handling of ignitible (flammable and combustible) liquids. These hazards include, but are not limited to, preparation, separation, purification, and change of state, energy content, or composition.

A.66.6.3
The evaluation for management of fire hazards should consider probability of an ignitible mixture, the presence of a credible ignition source, and consequences of an ignition. Where the risk is unacceptable to the AHJ, explosion protection in accordance with NFPA 69, or deflagration venting in accordance with NFPA 68, or a combination of the two should be provided. See also Guidelines for Chemical Process Quantitative Risk Analysis, 2nd edition, from the Center for Chemical Process Safety/American Institute of Chemical Engineers.

66.6.4 Hazards Analysis.

66.6.4.1 General.
Operations involving ignitible (flammable and combustible) liquids shall be reviewed to ensure that fire and explosion hazards are addressed by fire prevention, fire control, and emergency action plans, except as provided in 66.6.4.1.1.

66.6.4.1.1 Exception No. 1:
(1) Operations where liquids are used solely for on-site consumption as fuels.

(2) Operations where Class II or Class III liquids are stored in atmospheric tanks or transferred at temperatures below their flash points.
Exception No. 3: Mercantile occupancies, crude petroleum exploration, drillings, and well servicing operations, and normally unoccupied facilities in remote locations. [30:6.4.1.1]

66.6.4.1.2 Engineering Evaluation.

66.6.4.1.2.1
The extent of fire prevention and control that is provided shall be determined in consultation with the authority having jurisdiction or by means of an engineering evaluation of the operation and application of sound fire protection and process engineering principles. [30:6.4.1.2.1]

A.66.6.4.1.1A.66.6.4.1.2.1
The wide range in size, design, and location of liquid-processing facilities precludes the inclusion of detailed fire and hazard prevention and control systems and methods applicable to all such facilities. The user should seek further guidance from documents such as NFPA 551 and the SFPE’s Engineering Guide to Fire Risk Assessment. [30:A.6.4.1.2.1A.6.4.1.1]

66.6.4.1.166.6.4.1.2.2 *
The extent of fire prevention and control that is provided shall be determined in consultation with the AHJ or by means of an engineering evaluation of the operation and application of sound fire protection and process engineering principles. This evaluation shall include, but not be limited to, the following:

1. Analysis of the fire and explosion hazards of the operation
2. Analysis of emergency relief from process vessels, taking into consideration the properties of the materials used and the fire protection and control measures taken
3. Analysis of applicable facility design requirements in Chapters 17, 18, 19, 28, and 29 of NFPA 30
4. Analysis of applicable requirements for liquid handling, transfer, and use, as covered in Chapters 17, 18, 19, 28, and 29 of NFPA 30
5. Analysis of local conditions, such as exposure to and from adjacent properties and exposure to floods, earthquakes, and windstorms
6. Analysis of the emergency response capabilities of the local emergency services

[30:6.4.1.2.2]

66.6.4.1.3 *
Storage, processing, handling, and use of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] heated at or above their flash point shall follow the requirements for Class I liquids [FP < 100°F (37.8°C)], unless an engineering evaluation conducted in accordance with Section 66.6 justifies following the requirements for some other liquid class. [30:6.4.1.3]

A.66.6.4.1.2
Storage, processing, handling, and use of Class II and Class III liquids [FP≥ 100°F (37.8°C)] at temperatures above the flash point can produce ignitable vapors if the liquid is released or vessels are
vented. Class I liquid [FP < 100°F (37.8°C)] requirements address such events to minimize the likelihood of ignition and the consequences if ignition occurs, thus becoming a benchmark for design features when Class II and Class III liquids [FP ≥ 100°F (37.8°C)] are handled above the flash point. However, their characteristics differ from those of Class I liquids [FP < 100°F (37.8°C)]. For example, the extent of travel of the Class II and III vapors is limited by the quick condensation of released vapors as they cool to lower temperatures. This might justify a more limited electrical area classification, different ventilation, elimination of explosion venting, and so forth. In addition, the process handling these Class II and Class III heated liquids may incorporate safety design features that accomplish the intent of NFPA 30, that is to address the hazards of released vapors. Further, the more restrictive building construction requirements in Table 17.6.1 of NFPA 30 might not be necessary for a particular process involving Class II, and Class III liquids [FP ≥ 100°F (37.8°C)] heated above the flash point. The option of conducting an engineering evaluation in accordance with Section 66.6 was included to allow the use of alternative designs to address the level of hazards identified. The SFPE’s Engineering Guide to Performance-Based Fire Protection provides a methodology on how to perform an alternative design. [30:A.6.4.1.32]

**A.66.6.5.1(8)**

With respect to frictional heat or sparks, it is recognized that there is a need to control sources of ignition, including mechanical sparks from hand tools, that have sufficient energy to ignite flammable vapors. Studies, anecdotes, codes, and referenced standards, and other historical documents (e.g., API 2214, Spark Ignition Properties of Hand Tools) show that there is a potential for hand tool sparks to ignite flammable vapors from a limited number of chemicals and under certain unique conditions. These include Class I liquids [FP < 100°F (37.8°C)] and flammable liquids with low minimum ignition energies, operations in which flammable or combustible ignitable liquids are heated, and atypical spark generation that can occur between specific types of hand tools and struck surfaces (i.e., thermite reactions or impact of steel tools on quartzitic materials). Even spark-resistant tools might not provide suitable protection against ignition. For example, hard metal particles can become imbedded in the relatively soft metal of spark-resistant tools, and these particles can cause sparks when the tools are used. [30:A.6.5.1(8)]

NFPA 30 requires analyses, such as job safety analyses or activity hazard analyses, of the hazards and risks of a given task and the application of appropriate protective measures to prevent or mitigate the hazards and risks. This includes identification and mitigation of ignition risk from multiple sources, including hand tools. Due to the complexity of the numerous operations involving Class I liquids [FP < 100°F (37.8°C)], NFPA 30 cannot address all conditions in which spark-resistant tools should be made mandatory, might be advisable, or are unnecessary to help control the ignition risk of any given operation. [30:A.6.5.1(8)]

It is recognized that the adoption of the new Globally Harmonized System for labeling by the U.S. Occupational Safety and Health Administration (29 CFR 1910.1200, Appendix C) creates a generalized mandate for the use of spark-resistant tools. However, based on available technical information, this mandate goes beyond what is considered necessary for fire safety, given the fact that it applies to liquids that present little risk of ignition unless heated to or above their flash points. (See A.66.6.4.1.2.) [30:A.6.5.1(8)]
66.6.5.3.1
Welding, cutting, and similar spark-producing operations shall not be permitted in areas containing Class I flammable liquids \([\text{FP} < 100^\circ\text{F} (37.8^\circ\text{C})]\) until a written permit authorizing such work has been issued. \([30:6.5.3.1]\)

66.6.5.4.5
All nonmetallic equipment and piping where the potential exists for an ignitable mixture to be present shall be designed and operated to prevent electrostatic ignition. \([30:6.5.4.5]\)

66.6.6.2
Those areas, including buildings, where a potential exists for a Class I flammable liquid \([\text{FP} < 100^\circ\text{F} (37.8^\circ\text{C})]\) liquid-spill shall be monitored as appropriate. The following methods shall be permitted to be used:

1. Personnel observation or patrol
2. Process-monitoring equipment that would indicate a spill or leak could have occurred
3. Provision of gas detectors to continuously monitor the area where facilities are unattended

\([30:6.6.2]\)

66.6.7.1 *
This section identifies recognized fire protection and fire suppression systems and methods used to prevent or minimize the loss from fire or explosion in ignitable (flammable or combustible) liquid-processing facilities. The application of one or a combination of these systems and methods as well as the use of fire-resistive materials shall be determined in accordance with Sections 66.6.3 and 66.6.4. \([30:6.7.1]\)

66.6.7.5
Where the need is indicated by the hazards of ignitable (flammable or combustible) liquid processing, storage, or exposure as determined by 66.6.4, fixed protection shall be provided. \([30:6.7.5]\)

66.6.9.2
Maintenance and operating practices shall be established and implemented to prevent and control leakage and spillage of ignitable (flammable or combustible) liquids. \([30:6.9.2]\)

66.6.10.1.1
This section shall apply to the management methodology used to identify, evaluate, and control the security hazards involved in the processing, storage, and handling of ignitable (flammable and combustible) liquids. \([30:6.10.1.1]\)

66.6.10.3.1
Operations involving ignitable (flammable and combustible) liquids shall be reviewed to ensure that security vulnerabilities identified during the security vulnerability assessment (SVA) are
addressed in a facility security program, with corresponding fire prevention and emergency action plans and drills. [30:6.10.3.1]

**66.7.1 Scope.**

This section shall apply to areas where Class I liquids \([FP < 100°F (37.8°C)]\) are stored, or handled, or used and to areas where Class II or Class III liquids \([FP ≥ 100°F (37.8°C)]\) are stored, or handled, or used at or above their flash points. [30:7.1]

**66.7.3.3 * Table 66.7.3.3 shall be used to delineate and classify areas for the purpose of installation of electrical utilization equipment and wiring under normal operating conditions. [30:7.3.3]**

<table>
<thead>
<tr>
<th><strong>Table 66.7.3.3 Electrical Area Classifications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>Indoor equipment installed in accordance with 66.7.3 where flammable vapor–air mixtures can exist under normal operation</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td><strong>Outdoor equipment of the type covered in 66.7.3 where flammable vapor–air mixtures can exist under normal operation</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td><strong>Tank storage installations inside buildings</strong></td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td><strong>Tank — aboveground, fixed roof</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Code</td>
</tr>
<tr>
<td>------</td>
</tr>
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<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Tank — aboveground, floating roof</td>
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<td>With fixed outer roof</td>
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<td>1</td>
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<tr>
<td>With no fixed outer roof</td>
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<tr>
<td>1</td>
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<tr>
<td>Tank vault — interior</td>
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<td>1</td>
</tr>
<tr>
<td>Underground tank fill opening</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Vent — discharging upward</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Drum and container filling — outdoors or indoors</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Pumps, bleeders, withdrawal fittings</td>
</tr>
<tr>
<td>Indoor</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Outdoor</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Pits and sumps</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Without mechanical ventilation</td>
</tr>
<tr>
<td>Entire area within a pit or sump if any part is</td>
</tr>
<tr>
<td>within a Division 1 or 2 or Zone 1 or 2 classified</td>
</tr>
<tr>
<td>location</td>
</tr>
<tr>
<td>With adequate mechanical ventilation</td>
</tr>
<tr>
<td>Entire area within a pit or sump if any part is</td>
</tr>
<tr>
<td>within a Division 1 or 2 or Zone 1 or 2 classified</td>
</tr>
<tr>
<td>location</td>
</tr>
<tr>
<td>Containing valves, fittings, or piping, and not</td>
</tr>
<tr>
<td>within a Division 1 or 2 or Zone 1 or 2 classified</td>
</tr>
<tr>
<td>location</td>
</tr>
<tr>
<td>Drainage ditches, separators, impounding basins</td>
</tr>
<tr>
<td>Outdoor</td>
</tr>
<tr>
<td>Area up to 18 in. above ditch, separator, or basin; also, area up to 18 in. above grade within 15 ft horizontally from any edge</td>
</tr>
<tr>
<td>Indoor</td>
</tr>
<tr>
<td>Same as pits and sumps</td>
</tr>
<tr>
<td>Tank vehicle and tank car[^1]</td>
</tr>
<tr>
<td>Loading through open dome</td>
</tr>
<tr>
<td>Area inside of the tank</td>
</tr>
<tr>
<td>Loading through bottom connections with</td>
</tr>
<tr>
<td>atmospheric venting</td>
</tr>
<tr>
<td>Area inside of the tank</td>
</tr>
<tr>
<td>Loading through closed dome with</td>
</tr>
<tr>
<td>atmospheric venting</td>
</tr>
<tr>
<td>Area between 3 ft of point of venting to</td>
</tr>
<tr>
<td>atmosphere, extending in all directions</td>
</tr>
<tr>
<td>Loading through closed dome with</td>
</tr>
<tr>
<td>vapor control</td>
</tr>
<tr>
<td>Area between 3 ft of point of connection of both</td>
</tr>
<tr>
<td>fill and vapor lines, extending in all directions</td>
</tr>
<tr>
<td>Bottom loading with vapor control or any bottom</td>
</tr>
<tr>
<td>unloading</td>
</tr>
<tr>
<td>Area between 3 ft of point of connections,</td>
</tr>
<tr>
<td>extending in all directions; also, up to 18 in.</td>
</tr>
<tr>
<td>above grade within a horizontal radius of 10 ft</td>
</tr>
<tr>
<td>from point of loading connection</td>
</tr>
<tr>
<td>Storage and repair garage for tank vehicles</td>
</tr>
<tr>
<td>All pits or spaces below floor level</td>
</tr>
</tbody>
</table>

[^1]: These recommendations apply only to tank vehicles and tank cars. They do not apply to other types of vehicles unless specifically noted.
Area up to 18 in. above floor or grade level for entire storage or repair garage

| Garages for other than tank vehicles | Ordinary | If there is any opening to these rooms within the extent of an outdoor classified location, the entire room shall be classified the same as the area classification at the point of the opening |
| Outdoor drum storage | Ordinary |
| Inside rooms or storage lockers used for the storage of Class I liquids \([\text{FP} < 100^\circ\text{F}(37.8^\circ\text{C})]\) | 2 | 2 | Entire room or locker |
| Indoor warehousing where there is no flammable Class I liquid \([\text{FP} < 100^\circ\text{F}(37.8^\circ\text{C})]\) transfer | Ordinary | If there is any opening to these rooms within the extent of an indoor classified location, the classified location shall extend through the opening to the same extent as if the wall, curb, or partition did not exist |
| Office and rest rooms | Ordinary | If there is any opening to these rooms within the extent of an indoor classified location, the room shall be classified the same as if the wall, curb, or partition did not exist |
| Piers and wharves | | See Figure 29.3.22 of NFPA 30. |

For SI units, 1 in. = 25 mm; 1 ft = 0.3 m.

1The release of Class I liquids \([\text{FP} < 100^\circ\text{F}(37.8^\circ\text{C})]\) can generate vapors to the extent that the entire building, and possibly an area surrounding it, should be considered a Class I, Division 2, or Zone 2 location.

2When classifying extent of area, consideration should be given to the fact that tank cars or tank vehicles can be spotted at varying points. Therefore, the extremities of the loading or unloading positions should be used. [30: Table 7.3.3]

66.7.3.6
The area classifications listed in Table 66.7.3.3 are based on the premise that all applicable requirements of this Code have been met. If this is not the case, the AHJ shall have the authority to classify the extent of the area. [30:7.3.6]

66.8 Application of Area Classification.
Area classification shall be used to assure that fixed electrical utilization equipment, electrical fixtures, and wiring are properly installed within Class I, Division 1; Class I, Zone 1; Class I, Division 2; or Class I, Zone 2 designated areas, as defined by Article 500 of NFPA 70. [30:7.4.1]

66.9 Storage of Ignitible (Flammable or Combustible) Liquids in Containers — General Requirements.

66.9.1.1
This section shall apply to the storage of ignitible (flammable and combustible) liquids in:

1. Drums or other containers that do not exceed 119 gal (450 L) individual capacity
(2) Portable tanks that do not exceed 660 gal (2500 L) individual capacity
(3) Intermediate bulk containers that do not exceed 793 gal (3000 L)

66.9.1.2
This section shall also apply to limited transfer of ignitable (flammable or combustible) liquids incidental thereto. [30:9.1.2]

66.9.1.4
This section shall not apply to the following:

(1) Containers, intermediate bulk containers, and portable tanks that are used in operations areas, as covered by Section 66.17
(2) Liquids in the fuel tanks of motor vehicles, aircraft, boats, or portable or stationary engines
(3) Beverages where packaged in individual containers that do not exceed 1.3 gal (5 L) capacity
(4) Beverages, medicines, foodstuffs, cosmetics, and other products that contain more than 20 percent by volume of water-miscible ignitable (flammable or combustible) liquids, with the remainder of the product consisting of components that do not burn
(5) Liquids that have no fire point when tested in accordance with ASTM D92, Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester, up to the BP of the liquid or up to a temperature at which the liquid shows an obvious physical change
(6) Liquids with a FP greater than 95°F (35°C) in a water-miscible solution or water-miscible dispersion with a water and noncombustible solids content of more than 80 percent by weight, and which does not sustain combustion when tested in accordance with “Method of Testing for Sustained Combustibility,” in accordance with 49 CFR 173, Appendix H, or the UN publication, Recommendations on the Transport of Dangerous Goods
(7) Distilled spirits and wines in wooden barrels or casks

66.9.2 General Requirements.

66.9.2.1
The general requirements of this section shall be applicable to the storage of ignitable (flammable or combustible) liquids in liquid storage areas as covered in Chapters 10 through 14 of NFPA 30, regardless of the quantities being stored.

Exception: Where more stringent requirements are set forth in Chapters 10 through 14 of NFPA 30, those requirements shall take precedence. [30:9.3.1]

66.9.2.2
For the purposes of Sections 66.9 through 66.16, unstable liquids shall be treated as Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)]. [30:9.3.2]

66.9.2.5
Class I liquids [FP < 100°F (37.8°C)] shall not be permitted to be stored in basements as defined in 3.3.22. [30:9.3.5]

66.9.2.6
Class II and Class IIIA liquids [100°F (37.8°C) ≤ FP < 200°F (93°C)] shall be permitted to be stored in basements as defined in 3.3.22, provided the basement is protected in accordance with Section 66.16. [30:9.3.6]

66.9.2.7
Class IIIB liquids [FP ≥ 200°F (93°C)] shall be permitted to be stored in basements as defined in 3.3.22. [30:9.3.7]

66.9.2.8.3 *
Power-operated industrial trucks used to move Class I liquids [FP < 100°F (37.8°C)] shall be selected, operated, and maintained in accordance with NFPA 505. [30:9.3.8.3]

A.66.9.2.8.3
Section 5.1 of NFPA 505 states, “In locations used for the storage of Class I flammable liquids [FP < 100°F (37.8°C)] in sealed containers or liquefied or compressed flammable gases in containers, approved power-operated industrial trucks designated as Types CNS, DS, ES, GS, LPS, GS/CNS, or GS/LPS shall be permitted to be used where approved by the AHJ.” Compared to the above types, industrial trucks that are designated DY and EE have significantly less potential for igniting flammable vapors (such as might result from a spill of Class I liquid [FP < 100°F (37.8°C)]) and should be used in inside liquid storage areas where conditions warrant. [30:A.9.3.8.3]

66.9.2.11
Storage, handling, and use of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] heated at or above their flash point FP shall follow the requirements for Class I liquids [FP < 100°F (37.8°C)], unless an engineering evaluation conducted in accordance with Section 66.6 justifies following the requirements for some other liquid class. (See 66.6.4.1.2.9.3.1.2 and A.66.6.4.1.2.) [30:9.3.11]

66.9.3 Acceptable Containers.

66.9.3.1 *
Only the following approved containers, intermediate bulk containers, and portable tanks shall be used for Class I, Class II, and Class IIIA liquids [FP < 200°F (93°C)]:

1. Metal containers, metal intermediate bulk containers, and metal portable tanks meeting the requirements of cont and containing products authorized by the U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR 100–199, or by Part 6 of the UN Recommendations on the Transport of Dangerous Goods

2. Plastic or metal consumer-use containers meeting the requirements of, and used within the scope of, ASTM F852, Standard Specification for Portable Gasoline, Kerosene and Diesel Containers for Consumer Use or one or more of the following specifications:
Nonmetallic or metallic commercial/industrial safety cans meeting the requirements of, and used within the scope of, one or more of the following specifications:

(a) UL 30, Metal Safety Cans
(b) UL 1313, Nonmetallic Safety Cans for Petroleum Products
(c) FM Global Approval Standard for Safety Containers and Filling, Supply, and Disposal Containers — Class Number 6051 and 6052

Plastic containers that meet requirements set by, and contain products authorized by, the following:

(a) The U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR 100–199, or by Part 6 of the UN publication, Recommendations on the Transport of Dangerous Goods
(b) Items 256 or 258 of the National Motor Freight Classification (NMFC) for liquids that are not classified as hazardous by the U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR 100–199, or by Part 6 of the UN publication Recommendations on the Transport of Dangerous Goods

Fiber drums that meet the following:

(a) Requirements of Items 294 and 296 of the National Motor Freight Classification (NMFC), or of Rule 51 of the Uniform Freight Classification (UFC), for Types 2A, 3A, 3B-H, 3B-L, or 4A
(b) Requirements of, and containing liquid products authorized by, either the U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR Chapter I, or by the U.S. Department of Transportation exemption

* Rigid nonmetallic intermediate bulk containers that meet requirements set by, and contain products authorized by, the following:

(a) The U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR 100–199, or by Part 6 of the UN publication, Recommendations on the Transport of Dangerous Goods, for Classes 31H1, 31H2, and 31HZ1
(b) The National Motor Freight Classification (NMFC), or the International Safe Transit Association for liquids that are not classified as hazardous by the U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR 100–199, or by Part 6 of the UN publication Recommendations on the Transport of Dangerous Goods

Glass containers up to the capacity limits stated in Table 66.9.3.3 and in accordance with U.S. Department of Transportation Hazardous Materials Regulations in 49 CFR 100–199

(8) Other nonmetallic intermediate bulk containers that comply with 66.9.3.1.1

A.66.9.3.1

It is not the intent of 66.9.3 to regulate containers and packaging systems for Class IIIB liquids \([FP > 200°F (93°C)]\), except as required for protected storage in accordance with Section 66.16 Chapter 16 of NFPA 30. [30:A.9.4.1]

A.66.9.3.1(6)

The term rigid nonmetallic intermediate bulk container is used to describe intermediate bulk containers that have a plastic vessel that serves as the primary liquid-holding component. This vessel can be
enclosed in or encased by an outer structure consisting of a steel cage, a single-wall metal or plastic enclosure, a double wall of foam or solid plastic, or a paperboard enclosure. These are often called composite IBCs, which is the term used by the U.S. Department of Transportation (DOT) to describe them. The term rigid nonmetallic intermediate bulk container also denotes an all-plastic single-wall IBC that might or might not have a separate plastic base and for which the containment vessel also serves as the support structure. IBCs and portable tanks that have a nonmetallic inner liner that have an outer liquidtight metal enclosure that is sufficient, in and of itself, to be compliant with the appropriate structure are considered to be metal IBCs or metal portable tanks by DOT/UN designation for a metal IBC or metal portable tank are considered metal IBCs or metal portable tanks and are defined in as designated under 66.9.3.1(1). [30:A.9.4.1(6)]

66.9.3.1.1
For protected storage, nonmetallic intermediate bulk containers shall comply with Table 66.9.3.3 and shall be listed and labeled in accordance with UL 236889, Fire Exposure Testing of Intermediate Bulk Containers for Flammable and Combustible Liquids; FM Class 6020, Approval Standard for Composite Intermediate Bulk Containers; or an equivalent test procedure. [30:9.4.1.1]

66.9.3.2.2
At least one pressure-actuated vent having a minimum capacity of 6000 ft³ (170 m³) of free air per hour at an absolute pressure of 14.7 psi (101 kPa) and 60°F (15.6°C) shall be used. The vent shall be set to open at not less than a gauge pressure of 5 psi (35 kPa). [30:9.4.2.2]

66.9.3.3
The maximum allowable size of a container, intermediate bulk container, or metal portable tank for Class I, Class II, and Class IIIA liquids [FP < 200°F (93°C)] shall not exceed that specified in Table 66.9.3.3.

Exception: As provided for in 66.9.1, 66.9.3.1, 66.9.3.3, and 66.9.3.3.4. [30:9.4.3]

<table>
<thead>
<tr>
<th>Table 66.9.3.3 Maximum Allowable Size — Containers, Intermediate Bulk Containers (IBCs), and Portable Tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container Type</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Glass</td>
</tr>
<tr>
<td>Metal (other than drums) or approved plastic</td>
</tr>
<tr>
<td>Safety cans</td>
</tr>
<tr>
<td>Metal drum (e.g., UN 1A1/1A2)</td>
</tr>
<tr>
<td>Approved metal portable tanks and IBCs</td>
</tr>
</tbody>
</table>
Rigid plastic IBCs (UN 31H1 or 31H2) and composite IBCs with rigid inner receptacle (UN31HZ1)*

<table>
<thead>
<tr>
<th></th>
<th>NP</th>
<th>NP</th>
<th>NP</th>
<th>793 gal (3000 L)</th>
<th>793 gal (3000 L)</th>
</tr>
</thead>
</table>

Composite IBCs with flexible inner receptacle (UN31HZ2) DOT/UN-approved flexible IBCs, and NMFC/ISTA-compliant IBCs†

<table>
<thead>
<tr>
<th></th>
<th>NP</th>
<th>NP</th>
<th>NP</th>
<th>331 gal (1300 L)</th>
<th>331 gal (1300 L)</th>
</tr>
</thead>
</table>

Non-bulk bag-in-box

<table>
<thead>
<tr>
<th></th>
<th>NP</th>
<th>NP</th>
<th>NP</th>
<th>NP</th>
<th>NP</th>
</tr>
</thead>
</table>

Polyethylene UN1H1 and UN1H2, or as authorized by DOT exemption

<table>
<thead>
<tr>
<th></th>
<th>1.3 gal (5 L)</th>
<th>5.3 gal (20 L)*</th>
<th>5.3 gal (20 L)*</th>
<th>119 gal (450 L)</th>
<th>119 gal (450 L)</th>
</tr>
</thead>
</table>

Fiber drum NMFC or UFC Type 2A; Types 3A, 3B-H, or 3B-L; or Type 4A

<table>
<thead>
<tr>
<th></th>
<th>NP</th>
<th>NP</th>
<th>NP</th>
<th>119 gal (450 L)</th>
<th>119 gal (450 L)</th>
</tr>
</thead>
</table>

NP: Not permitted for the container categories so classified unless a fire protection system is provided that is developed in accordance with 66.16.3.6 and is approved for the specific container and protection against static electricity is provided.

*See 66.9.34.3.1.
†See 66.9.43.3.2

See 66.4.1 for details on the classification scheme.

[30:Table 9.4.3]

### 66.9.3.3.1

Class IB and Class IC [FP < 100°F (37.8°C) and BP ≥ 100°F (37.8°C)] water-miscible liquids shall be permitted to be stored in plastic containers up to 60 gal (230 L) in size, if stored and protected in accordance with Table 66.16.5.2.7. [30:9.4.3.1]

### 66.9.3.3.2

Nonmetallic intermediate bulk containers, as permitted by Table 66.9.3.3, shall be listed and labeled in accordance with UL 2368, *Fire Exposure Testing of Intermediate Bulk Containers for Flammable and Combustible Liquids*; FM Class 6020, *Approval Standard for Composite Intermediate Bulk Containers*; or an equivalent test procedure. [30:9.4.3.2]

### 66.9.3.3.3

Class IA and Class IB [FP < 73°F (22.8°C)] liquids shall be permitted to be stored in glass containers of not more than 1.3 gal (5 L) capacity if the required liquid purity (such as American Chemical Society analytical reagent grade or higher) would be affected by storage in metal containers or if the liquid can cause excessive corrosion of a metal container. [30:9.4.3.3]

### 66.9.3.3.4.1

To be considered protected storage as defined in 66.9.2.1 of NFPA 30 and in accordance with Section 66.16, an overpack container shall be constructed of the same material as the leaking or damaged container. [30:9.4.3.4.1]
66.9.4 *Flammable Liquids* Storage Cabinets.

A.66.9.4

The requirements in 66.9.4 are based on hazards associated with fixed Class I flammable liquids [FP < 100°F (37.8°C)] storage cabinets. They do not address potential hazards associated with mobile storage cabinets (i.e., cabinets with integral wheels) such as the following:

1. Increased risk of spills
2. Potential for tipover or blockage of egress
3. Maintenance of vent and grounding integrity
4. Variable condition of exposed floor surfaces under the cabinet

[30:A.9.5]

66.9.4.1

The volume of Class I, Class II, and Class IIIA liquids [FP < 200°F (93°C)] stored in an individual storage cabinet shall not exceed 120 gal (460 L). [30:9.5.1]

66.9.4.2

The total aggregate volume of Class I, Class II, and Class IIIA liquids [FP < 200°F (93°C)] in a group of storage cabinets shall not exceed the maximum allowable quantity of flammable and combustible liquids per control area based on the occupancy where the cabinets are located. [30:9.5.2]

66.9.4.3

Storage cabinets that meet at least one of the following sets of requirements shall be acceptable for storage of ignitable (flammable or combustible) liquids:

1. Storage cabinets designed and constructed to limit the internal temperature at the center of the cabinet and 1 in. (25 mm) from the top of the cabinet to not more than 325°F (163°C), when subjected to a 10-minute fire test that simulates the fire exposure of the standard time-temperature curve specified in ASTM E119, *Fire Tests of Building Construction and Materials*, NFPA 251 shall be acceptable. All joints and seams shall remain tight and the door shall remain securely closed during the test.

2. Metal storage cabinets constructed in the following manner shall be acceptable:
   
   (a) The bottom, top, door, and sides of the cabinet shall be at least No. 18 gauge sheet steel and shall be double-walled, with 1/4 in. (38 mm) air space.
   
   (b) Joints shall be riveted, welded, or made tight by some equally effective means.
   
   (c) The door shall be provided with a three-point latch arrangement, and the door sill shall be raised at least 2 in. (50 mm) above the bottom of the cabinet to retain spilled liquid within the cabinet.

   (d) New cabinets shall have self-closing doors.

3. Wooden cabinets constructed in the following manner shall be acceptable:

   (a) The bottom, sides, and top shall be constructed of exterior-grade plywood that is at least 1 in. (25 mm) thick and of a type that will not break down or delaminate under fire conditions.

   (b) All joints shall be rabbetted and shall be fastened in two directions with wood screws.
Where more than one door is used, there shall be a rabbeted overlap of not less than 1 in. (25 mm).

Doors shall be equipped with a means of latching, and hinges shall be constructed and mounted in such a manner as to not lose their holding capacity when subjected to fire exposure.

(e) A raised sill or pan capable of containing a 2 in. (50 mm) depth of liquid shall be provided at the bottom of the cabinet to retain spilled liquid within the cabinet.

(e)(f) New cabinets shall have self-closing doors.

(4) Listed storage cabinets that have been constructed and tested in accordance with UL 1275, Flammable Liquid Storage Cabinets; FM Class Number 6050, Approval Standard for Storage Cabinets for Ignitable (Flammable and Combustible Liquids); or equivalent shall be acceptable.

66.9.4.5 *
Storage cabinets shall include the following marking: [30:9.5.5]

FLAMMABLE
KEEP FIRE AWAY

66.9.5.1 General Occupancy Limits.
The maximum allowable quantities (MAQs) of ignitible (flammable or combustible) liquids allowed in each control area shall not exceed the amounts specified in Table 66.9.5.1. [30:9.6.1]

<table>
<thead>
<tr>
<th>Liquid Class(es)</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>gal</td>
<td>L</td>
</tr>
<tr>
<td>IA</td>
<td>30</td>
<td>115</td>
</tr>
<tr>
<td>IB and IC</td>
<td>120</td>
<td>460</td>
</tr>
<tr>
<td>IA, IB, IC combined</td>
<td>120</td>
<td>460</td>
</tr>
<tr>
<td>II</td>
<td>120</td>
<td>460</td>
</tr>
<tr>
<td>IIIA</td>
<td>330</td>
<td>1,265</td>
</tr>
<tr>
<td>IIIB</td>
<td>13,200</td>
<td>50,600</td>
</tr>
</tbody>
</table>

IIIA

See 66.4.1 for details on the classification scheme.

Notes:
(1) Quantities are permitted to be increased 100 percent where stored in approved flammable liquid storage cabinets or in safety cans in accordance with this Code. Where Note 2 also applies, the increase for both notes is permitted to be applied accumulatively.
(2) Quantities are permitted to be increased 100 percent in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13. Where Note 1 also applies, the increase for both notes is permitted to be applied accumulatively.
(3) Containing not more than the maximum allowable quantity per control area of Class IA, Class IB, or Class IC [FP < 100°F (37.8°C)] flammable liquids, individually.

(4) Quantities are not limited in a building equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13 and designed in accordance with the protection criteria contained in Section 66.16 of this Code. [30:Table 9.6.1]

Exception: As modified by 66.9.5.2 and Chapters 10 through 14 of NFPA 30. [30:9.6.1]

66.9.5.2.1
For the following occupancies, the MAQs per control area shall not exceed the amounts specified in Table 66.9.5.2.1:

(1) Assembly
(2) Ambulatory health care
(3) Business
(4) Day care
(5) Detention and correctional
(6) Educational
(7) Health care
(8) Residential

[30:9.6.2.1]

Table 66.9.5.2.1 MAQs — Special Occupancy Limits

<table>
<thead>
<tr>
<th>Liquid Class(es)</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I and II</td>
<td>10</td>
</tr>
<tr>
<td>IIIA</td>
<td>60</td>
</tr>
<tr>
<td>IIIB</td>
<td>120</td>
</tr>
</tbody>
</table>

[30:Table 9.6.2.1]

66.9.5.2.2
For the occupancies specified in 66.9.5.2.1, storage in excess of 10 gal (38 L) of Class I and Class II liquids [FP < 140°F (60°C)] combined or in excess of 60 gal (227 L) of Class IIIA liquids [140°F (60°C) ≤ FP < 200°F (93°C)] shall be permitted where stored in ignitible (flammable or combustible) flammable liquids storage cabinets and where the total aggregate quantity does not exceed 180 gal (680 L). [30:9.6.2.2]

66.9.5.2.4
For ambulatory health care, day care, educational, and health care occupancies, the MAQ for Class IIIB liquids [FP ≥ 200°F (93°C)] shall be permitted to be increased 100 percent if the building is protected throughout with an automatic sprinkler system in stalled in accordance with Section 13.3 and NFPA 13. [30:9.6.2.4]

66.9.6.1
For the purpose of this Code, a control area shall be a space within a building where quantities of
ignitible (flammable or combustible) liquids that do not exceed the maximum quantities allowed by Table 66.9.5.1 or Table 66.9.5.2.1 are stored. [30:9.7.1]

66.9.6.3
Control areas located below grade that are considered basements, as defined in 3.3.22, shall not be utilized for the storage of Class I liquids [FP < 100°F (37.8°C)]. [30:9.7.3]

66.9.7 Classification of Occupancies That Exceed the Maximum Allowable Quantities AQs of Ignitible (Flammable or Combustible) Liquids per Control Area.

A.66.9.7.1
The Protection Level classifications are taken from NFPA 5000. Protection Levels 1, 4, and 5 do not apply to the storage of flammable and combustible (ignitible) liquids and are therefore not extracted here. [30:A.9.8.1]

66.9.7.1.1 Protection Level 2.
Buildings and portions thereof storing quantities of ignitible (flammable or combustible) liquids that are considered as High-Hazard Level 2 liquids and that exceed the maximum allowable quantities per control area shall be classified as Protection Level 2 occupancies. [30:9.8.1.1]

66.9.7.1.2 Protection Level 3.
Buildings and portions thereof storing quantities of ignitible (flammable or combustible) liquids that are considered as High-Hazard Level 3 liquids and that exceed the maximum allowable quantities per control area shall be classified as Protection Level 3 occupancies. [30:9.8.1.2]

66.9.7.2 Requirements for Specific Occupancies.
Ignitible (flammable or combustible) liquids stored in Protection Level 2 or Protection Level 3 occupancies shall meet the applicable requirements for storage in a Liquid Storage Room or Liquid Warehouse as defined in this Code and in NFPA 5000. [30:9.8.2]

66.9.8.1
Fire resistance ratings for ignitible (flammable or combustible) liquid storage areas shall comply with Storage areas shall be constructed to meet the fire resistance ratings specified in Table 66.9.8.1. Construction assemblies shall comply with the test specifications given in ASTM E119. [30:9.9.1]

<table>
<thead>
<tr>
<th>Type of Storage Area</th>
<th>Fire Resistance Rating (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interior Walls(^2), Ceilings, Intermediate Floors(^2)</td>
</tr>
<tr>
<td>Liquid storage room</td>
<td></td>
</tr>
<tr>
<td>Floor area ≤ 150 ft(^2)</td>
<td>1</td>
</tr>
<tr>
<td>Floor area &gt; 150 ft(^2), but ≤ 500 ft(^2)</td>
<td>2</td>
</tr>
</tbody>
</table>
For SI units, 1 ft² = 0.09 m².

Between liquid storage areas and any adjacent areas not dedicated to liquid storage.

A 4-hour firewall, in accordance with NFPA 221 is required except as follows: Fire resistance ratings for liquid warehouses storing only Class IIIB liquids, which are not heated above their flash point, are permitted to be reduced to 2 hours.

1) Where storage of liquids in a liquid warehouse is limited to Class IIIB liquids [FP ≥ 200°F (93°C)] that are not heated above their FP, 2-hour fire resistance rated assemblies are permitted.

2) Where a liquid warehouse is protected in accordance with Section 66.16, 2-hour fire resistance rated assemblies are permitted.

1)3) Where a liquid warehouse is protected in accordance with Section 66.16, accessory use areas, such as offices and restrooms, having a combined area is less than 10 percent of the area of the liquid warehouse do not require a fire resistance rating for the interior walls and ceilings.

The fire resistance rating for walls that are located more than 10 ft (3 m) but less than 50 ft (15 m) from an important building or line of adjoining property that can be built upon is permitted to be 2 hours.

Walls located 50 ft (15 m) or more from an important building or line of adjoining property that can be built upon do not require a fire resistance rating. Fire resistance ratings for liquid warehouses protected in accordance with Section 66.16 are permitted to be reduced to 2 hours.

This shall be a fire wall as defined in NFPA 221, Standard for High-Challenge Fire Walls, Fire Walls, and Fire Barrier Walls.

For exposing walls that are located more than 10 ft (3 m) but less than 50 ft (15 m) from an important building or line of adjoining property that can be built upon.

For exposing walls that are located 10 ft (3 m) or less from an important building or line of adjoining property that can be built upon.

For accessory use areas in protected liquid warehouses, such as offices and restrooms, whose combined area is less than 10 percent of the area of the warehouse, no fire resistance rating shall be required for the interior walls and ceilings.

Table 9.9.1

66.9.8.2

Acceptable methods for determining fire resistance shall be in accordance with this Code and the building code. [30:9.9.2]

66.9.8.3

Openings in interior walls to adjacent rooms or buildings and openings in exterior walls with fire resistance ratings shall be provided with normally closed, listed fire doors with fire protection ratings that correspond to the fire resistance rating of the wall as specified in Table 66.9.8.2. [30:9.9.32]

Table 66.9.8.2 Protection Ratings for Fire Doors
Fire Resistance Rating of Wall as Required by Table 66.9. 89.1

<table>
<thead>
<tr>
<th>(hr)</th>
<th>Fire Protection Rating of Door (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\frac{3}{4}$</td>
</tr>
<tr>
<td>2</td>
<td>$1\frac{1}{2}$</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

*One fire door required on each side of interior openings for attached liquid warehouses. [30: Table 9.9.23]*

**66.9.8.2.1** 66.9.8.3.1

Such doors shall be permitted to be arranged to stay open during material-handling operations if the doors are designed to close automatically in a fire emergency by provision of listed closure devices. [30:9.9.32.1]

**66.9.8.2.2** 66.9.8.3.2

Fire doors shall be installed in accordance with NFPA 80. [30:9.9.32.2]

**66.9.8.3** 66.9.8.4

Exterior walls shall be constructed to provide ready access for fire-fighting operations by means of access openings, windows, or lightweight, noncombustible wall panels.

*Exception: This requirement does not apply to liquid storage rooms totally enclosed within a building.* [30:9.9.44]

**66.9.11.2**

For liquid storage rooms that are totally enclosed within the building, electrical wiring and utilization equipment for Class I liquid [FP < 100°F (37.8°C)] storage shall be Class I, Division 2 (Zone 2), and electrical wiring and utilization equipment in inside rooms used for the storage of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] shall be suitable for ordinary purpose.

*Exception: Class I, Division 2 (Zone 2) requirements shall apply to Class II and Class III liquids [FP > 100°F (37.8°C)] when stored at temperatures above their FPflash points.* [30:9.12.2]

**66.9.12 *Containment, Drainage, and Spill Control.*

A.66.9.12

Spill containment can be accomplished by any of the following:

1. Listed liquid drainage floor assemblies — FM Approval Standard 6090, Approval Standard for Ignitable Liquid Drainage Floor Assemblies, is one example of a listing standard.

2. Noncombustible, liquidtight raised sills, curbs, or ramps of suitable height at exterior openings.

3. Noncombustible, liquidtight raised sills, curbs, or ramps of suitable height, or other flow-diverting structures at interior openings.

4. Sloped floors.
Open-grate trenches or floor drains that are connected to a properly designed drainage system.

Wall scuppers that discharge to a safe location or to a properly designed drainage system.

Other means that are acceptable to the AHJ.

Where sills, curbs, or ramps are used, the appropriate height will depend on a number of factors, including the maximum expected spill volume, the floor area, and the existence of any drainage systems. Historically, curbs and sills have been 4 in. (100 mm) high.

A variety of curb, sill, and ramp heights can be used to obtain the desired containment volume. As a guide, 1 ft² of water at a depth of 1 in. equals 0.6 gal (1 m² of water @ 25 mm = 25 L). Once the total quantity of liquid containment has been established, the necessary curb, sill, or ramp height can then be calculated.

Where open-grate trenches are used, the volume of the trench should be able to contain the maximum expected spill volume or otherwise be connected to a properly designed drainage system.

It should be noted that these containment and drainage provisions address only fire protection concerns. Consult the appropriate environmental regulations for other restrictions that could apply.

66.9.12.1
Storage areas shall be designed and operated to prevent the discharge of ignitable (flammable or combustible) liquids to public waterways, public sewers, or adjoining property, unless such discharge has been specifically approved.

66.9.12.4
Where only Class IIIB liquids [FP ≥ 200°F (93°C)] are stored, spill control, containment, and drainage shall not be required.

66.9.12.5
Where only unsaturated polyester resins (UPRs) containing not more than 50 percent by weight of Class IC, Class II, or Class IIIA liquid [73°F (22.8°C) ≤ FP < 200°F (93°C)] constituents are stored and are protected in accordance with 66.16.5.2.11, spill control, containment, and drainage shall not be required.

66.9.15.1 *
Where Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] are stored in containers larger than 1 gal (4 L), areas shall be provided with a means of explosion control that meets the requirements of NFPA 69. An approved engineered damage limiting construction design shall also be permitted.
Exception: This shall does not apply to a liquid storage room totally enclosed within a building.

A.66.9.15.1

Release of a Class IA liquid \([FP < 73^\circ F (22.8^\circ C) \text{ and } BP < 100^\circ F (37.8^\circ C)]\) into a room or enclosure can result in the evolution of large quantities of flammable vapor. The ignition of this flammable mixture can result in a significant pressure rise, the production of hot combustion gases, and flame. Failure to adequately design a room or building for this type of event can result in the failure of the room or building walls and/or roof and the uncontrolled release of the hot combustion gases, flames, and pressure. An acceptable method of protection against this type of event is the use of damage-limiting construction consisting of a combination of pressure-relieving construction and pressure-resistant construction as described in NFPA 68.

66.9.16.1

Except as provided for in 66.9.16.3, ignitable (flammable or combustible) liquids shall be separated from incompatible materials where the stored materials are in containers having a capacity of more than 5 lb (2.268 kg) or \(\frac{1}{2}\) gal (1.89 L).

66.9.16.1.1

Separation shall be accomplished by one of the following methods:

1. Segregating incompatible materials storage by a distance of not less than 20 ft (6.1 m)
2. Isolating incompatible materials storage by a noncombustible partition extending not less than 18 in. (460 mm) above and to the sides of the stored materials
3. Storing liquid materials in Class I liquids \([FP < 100^\circ F (37.8^\circ C)]\) flammable liquids storage cabinets in accordance with 66.9.4

66.9.16.2

Ignitable (flammable or combustible) liquids shall be separated from Level 2 and Level 3 aerosols in accordance with Chapter 61 and NFPA 30B.

66.9.16.3

Flammable and combustible liquids shall be separated from oxidizers by at least 25 ft (7.6 m).

66.9.16.4

Materials that are water-reactive, as described in NFPA 704, shall not be stored in the same control area with ignitable (flammable or combustible) liquids.

66.9.17 Dispensing, Handling, and Use of Ignitable (Flammable or Combustible) Liquids in Storage Areas.

66.9.17.1
Dispensing, handling, and use of ignitable (flammable or combustible) liquids shall meet all applicable requirements of Section 66.18. [30:9.18.1]

66.9.17.2
Dispensing of Class I liquids \([FP < 100°F (37.8°C)]\) or Class II and Class III liquids \([FP ≥ 100°F (37.8°C)]\) at temperatures at or above their flash points\(FP\) shall not be permitted in storage areas that exceed 1000 ft\(^2\) (93 m\(^2\)) in floor area unless the dispensing area is separated from the storage areas in accordance with Table 66.9.8.1 and meets all other requirements of 66.9.8. [30:9.18.2]

66.9.18 Outdoor Storage of Ignitable (Flammable or Combustible) Liquids.
Storage of ignitable (flammable or combustible) liquids outside of buildings shall meet the requirements of Section 66.14 or 66.15, whichever is applicable. [30:9.19]

66.14.1 *Scope.*
This section shall apply to the storage of ignitable (flammable or combustible) liquids in movable, modular, prefabricated storage lockers, also known as hazardous materials storage lockers (hereinafter referred to as lockers), specifically designed and manufactured for storage of hazardous materials, in the following:

1. Containers that do not exceed 119 gal (450 L) individual capacity
2. Portable tanks that do not exceed 660 gal (2500 L) individual capacity
3. Intermediate bulk containers that do not exceed 793 gal (3000 L) individual capacity

A.66.14.1
Environmental concerns have dictated special handling of hazardous materials, chemicals, and wastes. Some of these have flammable and combustible (ignitable) liquid characteristics, in addition to their environmental and health problems, thus causing some questions as to how they should be stored and handled. [30:A.14.1]

Several manufacturers have met this problem by designing and manufacturing movable, modular prefabricated storage lockers, working diligently with various building officials and AHJs. This results in a product that is intended to meet government standards and regulations for hazardous materials storage. Several municipalities have passed model ordinances covering the design, construction, and location of hazardous materials storage lockers. Design features can include, but are not limited to, the following:

1. Secondary spill containment sumps
2. Deflagration venting
3. Ventilation requirements, including mechanical ventilation where dispensing operations are expected
4. Electrical equipment for hazardous locations in accordance with NFPA 70
5. Static electricity control
6. Fire suppression systems (dry chemical or sprinklers)
7. Heavy structural design for the following:
(a) Security provisions
(b) Doors that lock and permit pallet loading
(c) Wind load, snow load, and storage load conditions
(d) Anchorage provisions
(e) Skid design, permitting relocation using lift trucks

(8) Fire-related exterior walls, if required
(9) Interior partitions to segregate incompatible materials
(10) Size limits to limit quantities that can be stored within preassembled or ready-to-assemble designs
(11) Nonsparking floors
(12) Shelving, if required
(13) Heating or cooling units, if needed
(14) Corrosion protection as required
(15) Employee safety provisions (eye/face wash)
(16) NFPA 704 hazard symbols

Features provided are determined by specific storage requirements and needs of the owner, keeping in mind applicable regulations and ordinances that apply and the approval requirements of the AHJ.

Several testing laboratories have developed internal procedures for the examination, testing, and listing or labeling of hazardous materials storage lockers submitted by manufacturers.

66.14.3.1
Lockers that are used as liquid storage rooms shall meet the requirements of Chapters 9 and 12 of NFPA 30, Section 66.14.4 and 66.14.6-66.9.

66.14.4.5
Where electrical wiring and electrical utilization equipment are required, they shall comply with Section 66.7 and 66.9.11.

66.14.4.8
Lockers shall include a spill containment system to prevent the flow of ignitible (flammable or combustible) liquids from the locker under emergency conditions.

66.14.6.1
Containers of ignitible (flammable or combustible) liquid in their original shipping packages shall be permitted to be stored either palletized or solid piled within the locker.

66.14.6.3
Containers over 30 gal (114 L) capacity storing Class I or Class II liquids [FP < 140°F (60°C)] shall not be
stored more than two containers high. [30:14.6.3]

66.15.1 Scope.
This section shall apply to the storage of ignitable (flammable or combustible) liquids outdoors in the following:

1. Drums or other containers that do not exceed 119 gal (450 L) individual capacity
2. Portable tanks that do not exceed 660 gal (2500 L) individual capacity
3. Intermediate bulk containers that do not exceed 793 gal (3000 L) individual capacity

[30:15.1]

66.15.3 General Requirements.
Outdoor storage of ignitable (flammable or combustible) liquids in containers, intermediate bulk containers, and portable tanks shall comply with Table 66.15.3 and with all applicable requirements of this section. [30:15.3]

Table 66.15.3 Storage Limitations for Outside Storage

<table>
<thead>
<tr>
<th>Liquid Class</th>
<th>Containers</th>
<th>Portable Tanks and Metal IBCs</th>
<th>Rigid Plastic and Composite IBCs</th>
<th>Minimum Separation Distance (ft)</th>
</tr>
</thead>
</table>
|              | Maxim um Quantit y per Pile (gal)
ab | Maxim um Storage Height (ft) | Maxim um Quantit y per Pile (gal)c | Maxim um Storage Height (ft) | Betwe en Piles or Rack Sectio ns | To Proper ty Line That Is or Can Be Built Upon | To Street, Alley, or Public Way |
| IA | 1,100 | 10 | 2,200 | 7 | NP | NP | 5 | 50 | 10 |
| IB | 2,200 | 12 | 4,400 | 14 | NP | NP | 5 | 50 | 10 |
| IC | 4,400 | 12 | 8,800 | 14 | NP | NP | 5 | 50 | 10 |
| II | 8,800 | 12 | 17,600 | 14 | 8,800 | 14 | 5 | 25 | 5 |
| III | 22,000 | 18 | 44,000 | 14 | 22,000 | 18 | 5 | 10 | 5 |

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L.
NP: Not permitted.

abSee 66.4.1 for details on the classification scheme.
acSee 66.15.3.1 regarding mixed-class storage.
bSee 66.15.3.4 for smaller pile sizes.
cFor storage in racks, the quantity limits per pile do not apply, but the rack arrangements should be limited to a maximum of 50 ft (15 m) in length and two rows or 9 ft (2.7 m) in depth.
dSee 66.15.3.3 regarding protection for exposures. [30:Table 15.3]

66.15.3.5.1
Where curbs are used, provisions shall be made to drain accumulations of groundwater or rainwater or
spills of ignitible (flammable or combustible) liquids. Drains shall terminate at a safe location and shall flow freely under fire conditions. [30:15.3.5.1]

66.15.4.1
A maximum of 1100 gal (4160 L) of ignitible (flammable or combustible) liquids in containers, intermediate bulk containers, or portable tanks shall be permitted to be stored adjacent to a building under the same management, provided the following conditions apply:

1. The adjacent building wall has an exterior fire resistance rating of 2 hours.
2. The adjacent building wall has no openings at grade or above grade that are within 10 ft (3 m) horizontally of the storage.
3. The adjacent building wall has no openings directly above the storage.
4. The adjacent building wall has no openings below grade within 50 ft (15 m) horizontally of the storage. [30:15.4.1]

66.15.4.2
The provisions of 66.15.4.1(1) through (4) shall be permitted to be waived, subject to the approval of the AHJ, if the building in question is one story, is of fire-resistive or noncombustible construction, and is devoted principally to the storage of ignitible (flammable or combustible) liquids. [30:15.4.2]

66.15.4.3
The quantity of ignitible (flammable or combustible) liquid stored adjacent to a building that meets the conditions of 66.15.4.1(1) through (4) shall be permitted to exceed that permitted in 66.15.4.1, provided the maximum quantity per pile does not exceed 1100 gal (4160 L) and each pile is separated by a 10 ft (3 m) minimum clear space along the common wall. [30:15.4.3]

66.15.4.4
The quantity of ignitible (flammable or combustible) liquid stored shall be permitted to exceed the 1100 gal (4160 L) quantity specified by 66.15.4.1 where a minimum distance equal to that specified by Table 66.15.3 for distance to property line shall be maintained between buildings and the nearest container or portable tank. [30:15.4.4]

66.16.1.1 *
This section shall apply to automatic fire protection systems for all inside storage of ignitible (flammable or combustible) liquid in containers, intermediate bulk containers, and portable tanks as specified in 66.9.3. [30:16.1.1]

A.66.16.1.1
See Annex E of NFPA 30 for limitations of the protection criteria of Table 16.5.2.1 through Table 16.5.2.12 of NFPA 30, particularly for intermediate bulk containers and portable tanks having capacities greater than 60 gal (230 L). [30:A.16.1.1]

Protected storage allowed under previous editions of NFPA 30 can be continued if the class of liquids
stored, the quantity of liquids stored, fire protection, and building configuration remain unchanged. Table A.66.16.1.1(a) and Table A.66.16.1.1(b), reprinted here from the 1993 edition of NFPA 30, can be used as a reference for storage arrangements in previously approved, protected, inside liquid storage areas. [30:A.16.1.1]

For certain liquids such as ketones, esters, and alcohols, the minimum required densities established in the listing criteria for foam discharge devices are often higher than the general densities specified for protection of flammable and combustible (i.e., ignitible) liquids. When determining the design criteria for extinguishing systems using foam, it is important to ensure that the listing criteria, which are typically based on empirical data from fire tests, are not overlooked. Otherwise, the fire protection system design can be inadequate for proper protection. [30:A.16.1.1]

Early suppression fast-response (ESFR) sprinklers have been tested for protection of liquids only to the extent reflected in the tables in Section 16.5 of NFPA 30. Any other use of ESFR sprinklers for protection of liquids should be based on an engineering analysis that evaluates the potential failure of the sprinkler system based on a rapid-growth fire or a large pool fire that would operate more sprinklers than are accommodated by the design area. The use of ESFR protection, particularly without provisions for the control of spread of liquid, presents the possibility of a liquid pool fire that could exceed the limited design operating area of an ESFR system. [30:A.16.1.1]

The information in Table 16.5.2.1 through Table 16.5.2.12 of NFPA 30 was developed from full-scale fire tests. Where only one K-factor sprinkler is allowed, this was the only size proven to provide fire control. Where a choice of K-factors is allowed by the tables, each was able to provide fire control; however, the larger K-factor sprinklers sometimes demonstrated better fire control and further limited fire damage. Where only one response–type of sprinkler is allowed, this is the only type of sprinkler proven to provide fire control. Where a choice of response characteristics (SR or QR) is allowed by the tables, each was able to provide fire control; however, the QR sprinklers sometimes demonstrated better fire control and further limited fire damage. [30:A.16.1.1]

In the testing involving metal containers, only steel containers were tested. Other metal containers, such as aluminum, have not been tested. [30:A.16.1.1]

Table A.66.16.1.1(a) Storage Arrangements for Protected Palletized or Solid Pile Storage of Liquids in Containers and Portable Tanks

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**Table A.66.16.1.1(a) Storage Arrangements for Protected Palletized or Solid Pile Storage of Liquids in Containers and Portable Tanks**
### Table A.66.16.1.1(b) Storage Arrangements for Protected Rack Storage of Liquids in Containers and Portable Tanks

<table>
<thead>
<tr>
<th>Liquid Class</th>
<th>Storage Level</th>
<th>Maximum Storage Height (ft)</th>
<th>Maximum Quantity per Pile (gal)</th>
<th>Maximum Quantity* (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Containers</td>
<td>Portable Tanks</td>
<td>Containers</td>
</tr>
<tr>
<td>IA</td>
<td>Ground floor</td>
<td>5</td>
<td>—</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>Upper floors</td>
<td>5</td>
<td>—</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>Basement</td>
<td>NP</td>
<td>NP</td>
<td>—</td>
</tr>
<tr>
<td>IB</td>
<td>Ground floor</td>
<td>6½</td>
<td>7</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>Upper floors</td>
<td>6½</td>
<td>7</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>Basement</td>
<td>NP</td>
<td>NP</td>
<td>—</td>
</tr>
<tr>
<td>IC</td>
<td>Ground floor</td>
<td>6½†</td>
<td>7</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>Upper floors</td>
<td>6½†</td>
<td>7</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>Basement</td>
<td>NP</td>
<td>NP</td>
<td>—</td>
</tr>
<tr>
<td>II</td>
<td>Ground floor</td>
<td>10</td>
<td>14</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td>Upper floors</td>
<td>10</td>
<td>14</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td>Basement</td>
<td>5</td>
<td>7</td>
<td>7,500</td>
</tr>
<tr>
<td>III</td>
<td>Ground floor</td>
<td>20</td>
<td>14</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>Upper floors</td>
<td>20</td>
<td>14</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>Basement</td>
<td>10</td>
<td>7</td>
<td>10,000</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L.
NP: Not permitted.
*Applies only to cut-off rooms and attached buildings.
†These height limitations can be increased to 10 ft for containers of 5 gal capacity or less. [30: Table A.16.1.1(a)]
<table>
<thead>
<tr>
<th>Liquid Class</th>
<th>Type Rack</th>
<th>Storage Level</th>
<th>Maximum Storage Height of Containers (ft)</th>
<th>Maximum Quantity of Containers (gal)*†</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>Double row</td>
<td>Ground floor</td>
<td>25</td>
<td>7,500</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td>Upper floors</td>
<td>15</td>
<td>4,500</td>
</tr>
<tr>
<td></td>
<td>single row</td>
<td>Basement</td>
<td>NP</td>
<td>—</td>
</tr>
<tr>
<td>IB</td>
<td>Double row</td>
<td>Ground floor</td>
<td>25</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td>Upper floors</td>
<td>15</td>
<td>9,000</td>
</tr>
<tr>
<td></td>
<td>single row</td>
<td>Basement</td>
<td>NP</td>
<td>—</td>
</tr>
<tr>
<td>II</td>
<td>Double row</td>
<td>Ground floor</td>
<td>25</td>
<td>24,000</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td>Upper floors</td>
<td>25</td>
<td>24,000</td>
</tr>
<tr>
<td></td>
<td>single row</td>
<td>Basement</td>
<td>15</td>
<td>9,000</td>
</tr>
<tr>
<td>III</td>
<td>Multirow,</td>
<td>Ground floor</td>
<td>40</td>
<td>55,000</td>
</tr>
<tr>
<td></td>
<td>double row</td>
<td>Upper floors</td>
<td>20</td>
<td>55,000</td>
</tr>
<tr>
<td></td>
<td>or single row</td>
<td>Basement</td>
<td>20</td>
<td>25,000</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L.
NP: Not permitted.
*Maximum quantity allowed on racks in cut-off rooms and attached buildings.
†Maximum quantity allowed per rack section in liquid warehouses. [30: Table A.16.1.1(b)]

66.16.1.2 *
This section shall not apply to Class IA flammable liquids \([FP < 73^\circ F (22.8^\circ C) \text{ and } BP < 100^\circ F (37.8^\circ C)]\) or to unstable flammable or combustible liquids. [30:16.1.2]

A.66.16.1.2
To date, there has been no full-scale testing to determine appropriate fire protection design criteria for Class IA liquids \([FP < 73^\circ F (22.8^\circ C) \text{ and } BP < 100^\circ F (37.8^\circ C)]\) or unstable liquids. [30:A.16.1.2]

66.16.1.3
Storage of ignitible (flammable or combustible) liquids that is protected in accordance with the applicable requirements of this section shall be considered protected, as defined in 66.16.2.14. All other storage shall be considered unprotected unless an alternate means of protection has been approved by the AHJ. [30:16.1.3]

66.16.2 Definitions Specific to Section 66.16.
For the purpose of this section, the following terms in this section shall have the definitions given.
66.16.2.1 *Protected.
For the purposes of 66.16, this term shall apply to the storage of containers that meet the appropriate provisions of 66.16 or alternate provisions that have been approved by the Authority Having Jurisdiction (see 66.16.3.5 and 66.16.9). [30:16.2.2]

A.66.16.2.3
Table A.66.16.2.3 provides examples of commonly used metal containers that are considered either relieving style or nonrelieving style for use in developing protected storage arrangements in accordance with Table 16.5.2.1 through Table 16.5.2.12 of NFPA 30. [30:A.16.2.4]

<table>
<thead>
<tr>
<th>Container Type</th>
<th>Relieving Style</th>
<th>Nonrelieving Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1 qt(^a)</td>
<td>All</td>
<td>N/A</td>
</tr>
<tr>
<td>&gt;1 qt and ≤6 gal(^b)</td>
<td>Metal containers with plastic cap, or flexible or rigid plastic spout with plastic cap</td>
<td>Metal containers with steel spout and steel screw cap</td>
</tr>
<tr>
<td>≤1 gal, friction lid</td>
<td>Metal containers with metal friction-fit covers (e.g., paint can lid)</td>
<td>N/A</td>
</tr>
<tr>
<td>1 gal and ≤6 gal (lug cover)</td>
<td>Metal containers with metal covers held in place with a mechanical friction-fit (e.g., lug-type) closure mechanism</td>
<td>N/A</td>
</tr>
<tr>
<td>&gt;6 gal and ≤60 gal(^b,c) (drums)</td>
<td>Metal containers, tight or open-head (drums) having at least one 2 in. plastic plug (Note: Cap seals, if used, need to be plastic and nonmetallic)</td>
<td>Open head metal containers with steel covers having no steel flange openings; or open head and tight head metal containers with steel flange openings where only steel plugs and/or cap seals are used</td>
</tr>
<tr>
<td>&gt;60 gal and ≤793 gal</td>
<td>Metal portable tanks or metal intermediate bulk containers with at least one relief device conforming to the design, construction, and capacity of the container’s section</td>
<td>N/A</td>
</tr>
</tbody>
</table>

For SI units, 1 gal = 3.8 L, 1 qt = 1 L.
N/A: Not applicable.
\(^a\) All containers ≤1 qt are considered relieving style because their failure is inconsequential.
\(^b\) In full-scale fire tests, where containers were provided with both ½ in. (19 mm) and 2 in. (50 mm) relieving vent openings and, in some cases, both vents were obstructed by pallet slats, rupture of containers did not occur. Because it is not possible to determine if all conceivable obstruction scenarios were represented, where drums are stacked more than one high, provide an additional ½ in. (19 mm) or 2 in. (50 mm) pressure-relieving mechanism.
The use of plastic plugs instead of steel plugs (bungs) in a steel drum in order to achieve a relieving-style container should contemplate the following issues in order to assure the safe storage of liquids:

1. The compatibility of the plastic plug materials and gaskets with the liquids being stored.
2. The stability and shelf life of the liquids being stored as the plastic plugs can admit water vapor, oxygen, and light.
3. The difference in expansion coefficients for plastic plugs and steel drums for those drums subject to temperature variations and hot or cold conditions.
4. The tooling issues involved with the use of plastic plugs as the torque levels are different from those levels used for steel plugs.
5. The training of fill line operators in order to avoid cross-threading and/or the stripping of threads.
6. The voiding of the United Nations (UN) rating on the steel drum by installing plastic plugs. If the user needs to install a plug other than the one originally provided by the container manufacturer, then the user should contact the manufacturer to ensure that the UN rating will still be valid. [30: Table A.16.2.4]

66.16.2.4 *Unsaturated Polyester Resin (UPR).
A resin that contains up to 50 percent by weight of Class IC, Class II, or Class III \([FP > 73^\circ F (22.8^\circ C)]\) liquid, but no Class IA or Class IB \([FP < 73^\circ F (22.8^\circ C)]\) liquid. [30:16.2.5]

66.16.2.5 Viscous Liquid.
A liquid that gels, thickens, or solidifies when heated or whose viscosity at room temperature versus weight percent content of Class I, Class II, or Class III liquid \(\text{any FP or BP}\) is in the shaded portion of Figure 66.16.2.5. [30:16.2.6]

**Figure 66.16.2.5 Viscous Liquid: Viscosity Versus Weight Percent Flammable or Combustible (Ignitible) Component. [30: Figure 16.2.6]**

****INSERT FIGURE****

66.16.3.1 Where different classes of liquids, container types, and storage configurations are stored in the same protected area, protection shall meet either of the following:

1. Requirements of this section for the most severe storage fire hazard present
2. Where areas are not physically separated by a barrier or partition capable of delaying heat from a fire in one hazard area from fusing sprinklers in an adjacent hazard area, the required protection for the more demanding hazard shall:
   a. Extend 20 ft (6 m) beyond its perimeter, but not less than the required minimum sprinkler design area
   b. Be provided with means to prevent the flow of burning ignitible (flammable or combustible) liquid under emergency conditions into adjacent hazard areas
   c. Provide containment and drainage as required by 66.16.8

[30:16.3.1]

66.16.3.4 Viscous liquids, as defined in 66.16.2.5, shall be permitted to be protected using either one of the following, as applicable:
For metal containers, the criteria for a Class IIIB liquids [FP ≥ 200°F (93°C)], in accordance with Figure 66.16.4.1(a).

For nonmetallic containers, the criteria for Class IIIB liquids, [FP ≥ 200°F (93°C)], as determined by Figure 66.16.4.1(b).

For nonmetallic containers, the criteria for cartoned unexpanded Group A plastics in accordance with NFPA 13, as indicated in Figure 66.16.4.1(b).

66.16.3.7
To be considered protected by Table 66.16.5.2.9 and Table 66.16.5.2.10, rigid nonmetallic intermediate bulk containers shall be listed and labeled in accordance with UL 2368, *Fire Exposure Testing of Intermediate Bulk Containers for Flammable and Combustible Liquids*; FM Class 6020, *Approval Standard for Composite Intermediate Bulk Containers*; or an equivalent test procedure. [30:16.3.7]

66.16.4.1
Where automatic sprinkler systems or low-expansion foam-water sprinkler systems are used to protect storage of ignitable (flammable or combustible) liquids, Figure 66.16.4.1(a), Figure 66.16.4.1(b), or Figure 66.16.4.1(c), whichever is applicable, and the appropriate table in 66.16.5 shall be used to determine protection criteria. [30:16.4.1]

Figure 66.16.4.1(a) Fire Protection Criteria Decision Tree for Miscible and Nonmiscible Ignitable (Flammable or Combustible) Flammable and Combustible Liquids in Metal Containers. [30: Figure 16.4.1(a)]

****INSERT FIGURE****

Figure 66.16.4.1(b) Fire Protection Criteria Decision Tree for Miscible and Nonmiscible Ignitable (Flammable or Combustible) Flammable and Combustible Liquids in Nonmetallic Containers. [30: Figure 16.4.1(b)]

****INSERT FIGURE****

Figure 66.16.4.1(c) Fire Protection Criteria Decision Tree for Water-Miscible Ignitable (Flammable or Combustible) Flammable and Combustible Liquids in Nonmetallic Containers. [30: Figure 16.4.1(c)]

****INSERT FIGURE****

66.16.4.1.1
Figure 66.16.4.1(a) shall be used for miscible and nonmiscible ignitable (flammable or combustible) flammable and combustible liquids in metal containers, metal portable tanks, and metal intermediate bulk containers. [30:16.4.1.1]

66.16.4.1.2
Figure 66.16.4.1(b) shall be used for miscible and nonmiscible ignitable (flammable or combustible) flammable and combustible liquids in nonmetallic containers and in nonmetallic intermediate bulk containers. [30:16.4.1.2]
66.16.4.1.3
Figure 66.16.4.1(c) shall be used for water-miscible ignitable (flammable or combustible) liquids in nonmetallic containers and in nonmetallic intermediate bulk containers. [30:16.4.1.3]

66.16.5.1.2
When foam or foam-water fire protection systems are provided, discharge densities shall be determined based on the listing criteria of the foam discharge devices selected, the foam concentrate, the specific ignitable (flammable or combustible) liquids to be protected, and the criteria in the appropriate table in this section. Where the discharge densities given in the tables differ from those in the listing criteria for the discharge devices, the greater of the two shall be used. [30:16.5.1.2]

66.16.5.1.3
In-rack sprinklers shall be installed in accordance with the provisions of Section 13.3 and NFPA 13. In addition, the following modifications shall apply:

1. In-rack sprinklers shall be laid out in accordance with 66.16.5.1.10 and 66.16.6, as applicable.
2. Sprinklers in multiple-level in-rack sprinkler systems shall be provided with water shields unless they are separated by horizontal barriers or are specifically listed for installation without water shields.
3. A vertical clear space of at least 6 in. (150 mm) shall be maintained between the sprinkler deflector and the top of the tier of storage.
4. Sprinkler discharge shall not be obstructed by horizontal rack structural members.
5. Where in-rack sprinklers are installed below horizontal barriers, the deflector shall be located a maximum of 7 in. (180 mm) below the barrier.
6. Longitudinal and transverse flue spaces of at least 6 in. (150 mm) shall be maintained between each rack load. [30:16.5.1.3]

66.16.5.1.4
Ceiling sprinklers shall be installed in accordance with Section 13.3 and NFPA 13 and shall be permitted to have the following maximum head spacing:

1. Classes I, Class II, and Class IIIA liquids \[ \text{FP} < 200^\circ \text{F} (93^\circ \text{C}) \]: 100 ft² (9.3 m²) per sprinkler
2. Class IIIB liquids \[ \text{FP} \geq 200^\circ \text{F} (93^\circ \text{C}) \]: 120 ft² (11.1 m²) per sprinkler [30:16.5.1.4]

66.16.5.1.10
For the purposes of 66.16.5, the following shall apply to the in-rack sprinkler design layouts specified in Table 66.16.5.2.1 through Table 66.16.5.2.12:

1. Layout 1, as referenced in Table 66.16.5.2.1, shall mean one line of in-rack sprinklers 8 ft (2.4 m) above the floor in the longitudinal flue space, with sprinklers spaced not more than 10 ft (3 m) on center.
(2) Layout 2, as referenced in Table 66.16.5.2.1, shall mean one line of in-rack sprinklers 6 ft (1.8 m) above the floor and one line of in-rack sprinklers 12 ft (3.6 m) above the floor in the longitudinal flue space, with sprinklers spaced not more than 10 ft (3 m) on center. Sprinklers shall be staggered vertically.

(3) Layout 3, as referenced in Table 66.16.5.2.1 and Table 66.16.5.2.34, shall mean one line of in-rack sprinklers in the longitudinal flue space at every storage level above the floor except above the top tier, with sprinklers spaced not more than 10 ft (3 m) on center. Sprinklers shall be staggered vertically, where more than one level of in-rack sprinklers is installed.

(4) Layout 4, as referenced in Table 66.16.5.2.1 and Table 66.16.5.2.3, shall mean one line of in-rack sprinklers in the longitudinal flue space at every storage level, except above the top tier, beginning above the first storage level, with sprinklers spaced not more than 10 ft (3 m) on center. Sprinklers shall be staggered vertically where more than one level of in-rack sprinklers is installed.

(5) Layout 5, as referenced in Table 66.16.5.2.1, shall mean one line of in-rack sprinklers in the longitudinal flue space at every storage level above the floor except above the top tier and face sprinklers at the first storage level at each rack upright. In-rack sprinklers shall be spaced not more than 9 ft (2.7 m) on center and shall be staggered vertically, where more than one level of in-rack sprinklers is installed.

(6) Layout 6, as referenced in Table 66.16.5.2.1, shall mean one line of in-rack sprinklers in the longitudinal flue space at every other storage level above the first storage level except the top tier and face sprinklers at the first storage level at each rack upright. In-rack sprinklers shall be spaced not more than 10 ft (3 m) on center and shall be staggered vertically, where more than one level of in-rack sprinklers is installed.

(7) Layout 7, as referenced in Table 66.16.5.2.8, shall be as shown in Figure 66.16.6.5(a).

(8) Layout 8, as referenced in Table 66.16.5.2.8, shall be as shown in Figure 66.16.6.5(b) or Figure 66.16.6.5(c).

(9) Layout 9, as referenced in Table 66.16.5.2.8, shall be as shown in Figure 66.16.6.5(d) or Figure 66.16.6.5(e).

[30:16.5.1.10]

66.16.5.1.11
The “Fire Test Ref.” number given for each entry in Table 66.16.5.2.1 through Table 66.16.5.2.12 shall be used to identify the information on the fire tests on which the protection criteria for that entry are based.

[30:16.5.1.11]

66.16.5.2.1
Table 66.16.5.2.1 shall apply to the following:

(1) Automatic sprinkler protection
(2) Single- or double-row rack storage
(3) All liquid classes except Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] Nonmiscible liquids and miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume
(4) Metal containers, metal portable tanks, metal intermediate bulk containers
Relieving- or nonrelieving-style containers

Table 66.16.5.2.1 Design Criteria for Sprinkler Protection of Single- and Double-Row Rack Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft² = 0.09 m², 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min.

1. In-rack sprinkler design shall be based on the following:
   a. Where one level of in-rack sprinklers is installed, the design shall include the eight most hydraulically remote sprinklers.
   b. Where two levels of in-rack sprinklers are installed, the design shall include the six most hydraulically remote sprinklers on each level.
   c. Where three or more levels of in-rack sprinklers are installed, the design shall include the six most hydraulically remote sprinklers on the top three levels.

2. Protection for uncartoned or case-cut nonsolid shelf display up to 6.5 ft. (2 m) and storage above on pallets in racking and stored on shelf materials, including open wire mesh, or 2 in. × 6 in. (50 mm × 150 mm) wooden slats, spaced a minimum of 2 in. (50 mm) apart.

3. Increase ceiling density to 0.60 if more than one level of storage exists above the top level of in-rack sprinklers.

4. Double-row racks limited to maximum 6 ft (1.8 m) depth.

5. For K=8.0 and larger ceiling sprinklers, increase ceiling density to 0.60 over 2000 ft² if more than one level of storage exists above the top level of in-rack sprinklers.

6. Reduce in-rack sprinkler spacing to maximum 9 ft (2.7 m) centers.

7. The minimum in-rack discharge pressure shall not be less than 10 psi.

Table 66.16.5.2.2 Design Criteria for Sprinkler Protection of Palletized and Stacked Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

Table 66.16.5.2.2 shall apply to the following:

1. Automatic sprinkler protection
2. Palletized or stacked storage
3. All liquid classes except Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] Nonmiscible liquids and miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume
4. Metal containers, metal portable tanks, metal intermediate bulk containers
5. Relieving- or nonrelieving-style containers

Table 66.16.5.2.2 Design Criteria for Sprinkler Protection of Palletized and Stacked Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft² = 0.09 m², 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min.

For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). See also 66.16.5.1.9(5). #See 66.4.14.2 for details on classification scheme.
Notes:
(1) Minimum hose stream demand can be reduced to 250 gpm for 2 hours.
(2) Sprinklers must also be hydraulically calculated to provide a density of 0.80 gpm/ft² over 1000 ft².
(3) Drums must be placed on open slatted pallet, not nested, to allow pressure relief from drums on lower levels.

[30: Table 16.5.2.2]

66.16.5.2.3

Table 66.16.5.2.3 shall apply to the following:
(1) Foam–water sprinkler protection
(2) Single- or double-row rack storage
(3) All liquid classes except Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] Nonmiscible liquids and miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume
(4) Metal containers, metal portable tanks, metal intermediate bulk containers
(5) Relieving- or nonrelieving-style containers

[30:16.5.2.3]

Table 66.16.5.2.3 Design Criteria for Foam-Water Sprinkler Protection of Single- or Double-Row Rack Storage of Ignitable (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft² = 0.09 m², 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min.
For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). See also 66.16.5.1.9(5).

# See 66.4.1 for details on classification scheme.

Notes:
(1) In-rack sprinkler design based on the six most hydraulically remote sprinklers in each of the upper three levels.
(2) Design area can be reduced to 1500 ft² when using a preprimed foam-water system installed in accordance with NFPA 16 and maintained according to NFPA 25.
(3) Design area can be reduced to 2000 ft² when using a preprimed foam-water system installed in accordance with NFPA 16 and maintained according to NFPA 25.
(4) In-rack sprinkler hydraulic design can be reduced to three sprinklers operating per level, with three levels operating simultaneously, when using a preprimed foam-water sprinkler system designed in accordance with NFPA 16 and maintained in accordance with NFPA 25.
(5) The minimum in-rack sprinkler discharge pressure shall not be less than a gauge pressure of 10 psi.

[30: Table 16.5.2.3]

66.16.5.2.4

Table 66.16.5.2.4 shall apply to the following:
(1) Foam–water sprinkler protection
Palletized or stacked storage

All liquid classes except Class IA liquids \([\text{FP} < 73^\circ\text{F} (22.8^\circ\text{C}) \text{ and } \text{BP} < 100^\circ\text{F} (37.8^\circ\text{C})]\) Nonmiscible liquids and miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume

Metal containers, metal portable tanks, metal intermediate bulk containers

Relieving- or nonrelieving-style containers

Table 66.16.5.2.4 Design Criteria for Foam-Water Sprinkler Protection of Palletized and Stacked Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft² = 0.09 m², 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min.

For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). See also 66.16.5.1.9(5). 

Notes:

1. Design area can be reduced to 2000 ft² when using a pre-primed foam-water system installed in accordance with NFPA 16 and maintained according to NFPA 25.
2. Both \(1/2\) in. (20 mm) and 2 in. (50 mm) listed pressure-relieving mechanisms are required on containers greater than 6 gal (23 L) capacity.
3. Drums placed on open slatted pallet, not nested, to allow pressure relief from drums on lower levels. [30: Table 16.5.2.4]

66.16.5.2.5

Table 66.16.5.2.5 shall apply to the following:

1. Automatic sprinkler protection
2. Single-, double-, or multiple-row rack storage
3. Class IIIB liquids \([\text{FP} \geq 200^\circ\text{F} (93^\circ\text{C})]\) Class IIIB nonmiscible liquids and Class IIIB miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume
4. Nonmetallic containers or intermediate bulk containers
5. Cartoned or uncartoned

Note: Construction of intermediate bulk container to be a minimum of 8 layers of paperboard, with a minimum nominal thickness of \(1/2\) in. (38 mm) at the center of any side panel.

66.16.5.2.6

Table 66.16.5.2.6 shall apply to the following:
(1) Automatic sprinkler protection
(2) Shelf storage
(3) All liquid classes except Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] Nonmiscible liquids and miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume
(3)(4) Metal containers
(4)(5) Nonrelieving-style metal containers

Table 66.16.5.2.6 Design Criteria for Sprinkler Protection of Shelf Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft² = 0.09 m², 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min.

For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). See also 66.16.5.1.9(5).

Notes:
(1) Protection limited to mercantile shelving that is 2 ft (600 mm) or less in depth per side, with backing between each side.
(2) Minimum hose stream demand can be reduced to 250 gpm for 2 hours. [30: Table 16.5.2.6]
(3) The minimum aisle width shall not be less than 5 ft (1.5 m).

[30: Table 16.5.2.6]

66.16.5.2.7
Table 66.16.5.2.7 shall apply to the following:
(1) Automatic sprinkler protection
(2) Single- or double-row rack storage
(3) Water-miscible ignitible (flammable or combustible) liquids with concentration of flammable or combustible component greater than 50 percent by volume
(4) Glass or plastic containers
(5) Cartoned or uncartoned
(6) Minimum 8 ft (2.4 m) aisle width

[30:16.5.2.7]

Table 66.16.5.2.7 Design Criteria for Sprinkler Protection of Single- and Double-Row Rack Storage of Water-Miscible Ignitible (Flammable or Combustible) Liquids in Glass or Plastic Containers

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m.

Notes:
(1) Minimum aisle width in all cases is 8 ft (2.4 m).
(2) Maximum rack depth in all cases is 9 ft (2.7 m).

[30:Table 16.5.2.7]
66.16.5.2.8
Table 66.16.5.2.8 shall apply to the following:

1. Automatic sprinkler protection
2. Single- or double-row rack storage or palletized storage
3. All liquid classes except Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] Nonmiscible liquids and miscible liquids with concentration of flammable or combustible component greater than 50 percent by volume
4. Relieving-style metal containers

Table 66.16.5.2.8 Design Criteria for Sprinkler Protection of Single-Row Rack, Double-Row Rack, and Palletized Storage of Ignitable (Flammable or Combustible) Liquids in Relieving-Style Metal Containers
For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 psi = 6.9 kPa.

Notes:
1. The in-rack sprinkler water demand shall be based on the simultaneous operation of the most hydraulically remote sprinklers as follows:
   a. Seven sprinklers where only one level of in-rack sprinklers is installed.
   b. Fourteen sprinklers (seven on each of the two top levels) where more than one level of in-rack sprinklers is installed.
2. The in-rack sprinkler water demand should be balanced with the ceiling sprinkler water demand at their point of connection.
3. One-gallon and 1-quart containers are not required to be relieving style.
4. Provide minimum 3 in. transverse flue at rack uprights.
5. For Class IIIB liquids [FP ≥ 200°F (93°C)], see also Table 66.16.5.2.5.
6. Racks can have open-mesh wire intermediate shelving on lower levels.
7. The minimum in-rack sprinkler discharge pressure shall not be less than a gauge pressure of 10 psi.

66.16.5.2.9
Table 66.16.5.2.9 shall apply to the following:

1. Automatic sprinkler protection
2. Palletized storage
3. Class IIIIB liquids [FP ≥ 200°F (93°C)] Class II and Class III nonmiscible and Class II and Class III miscible liquids
4. Listed and labeled rigid nonmetallic intermediate bulk containers
Table 66.16.5.2.9 Design Criteria for Sprinkler Protection of Palletized Storage of Class II and Class III Liquids in Listed and Labeled Rigid Nonmetallic IBCs

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min, 1 ft² = 0.09 m².

For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). See also 66.16.5.1.9(5).

Note: See also 16.5.2.9.1 through 16.5.2.9.3.

Notes:

(1) 66.16.5.2.9.1

Foam-water sprinkler protection shall be permitted to be substituted for water sprinkler protection, provided the same design criteria are used. [30:16.5.2.9.1]

(2) 66.16.5.2.9.2

Rigid nonmetallic intermediate bulk containers shall be listed and labeled in accordance with UL 2368, *Fire Exposure Testing of Intermediate Bulk Containers for Flammable and Combustible Liquids*; FM Class 6020, *Approval Standard for Intermediate Bulk Containers*; or an equivalent test procedure. [30:16.5.2.9.2]

(3) 66.16.5.2.9.3

The sprinkler operating gauge pressure shall be a minimum 30 psi (207 kPa). [30:16.5.2.9.3]

(4) 66.16.5.2.10

Table 66.16.5.2.10 shall apply to the following:

1. Automatic sprinkler protection
2. Single- or double-row rack storage
3. Class II and Class III nonmiscible and Class II and Class III miscible liquids [FP ≥ 100°F (37.8°C)]
4. Listed and labeled rigid nonmetallic intermediate bulk containers

Table 66.16.5.2.10 Design Criteria for Sprinkler Protection of Single- and Double-Row Rack Storage of Class II and Class III Liquids [FP ≥ 100°F (37.8°C)] in Listed and Labeled Rigid Nonmetallic IBCs

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m.

Notes:

(1) Rigid nonmetallic intermediate bulk containers are listed and labeled in accordance with UL 2368, *Fire Exposure Testing of Intermediate Bulk Containers for Flammable and Combustible Liquids*, or an equivalent test procedure.
(2) Maximum rack depth is 9 ft (2.7 m).
(3) Minimum aisle width is 8 ft (2.4 m).

[30:Table 16.5.2.9]
66.16.5.2.11
Table 66.16.5.2.11 shall apply to the following:
(1) Automatic sprinkler protection
(2) Palletized or stacked storage
(3) Unsaturated polyester resins (UPRs) with not more than 50 percent by weight of Class IC, Class II, or Class IIIA liquid \[73°F (22.8°C) \leq FP < 200°F (93°C)\]
(4) Metal containers; nonrelieving-style metal containers; nonrelieving-style allowed only up to 6 gal (23 L)

Table 66.16.5.2.11 Design Criteria for Sprinkler Protection of Palletized or Stacked Storage of Unsaturated Polyester Resins in Metal Containers
For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft$^2$ = 0.09 m$^2$, 1 gpm/ft$^2$ = 40.7 L/min/m$^2$ = 40.7 mm/min.
For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). See also 66.16.5.1.9(5).

Notes:
(1) Drums placed on open, slatted pallet, not nested, to allow pressure relief from drums on lower levels.
(2) Storage areas containing unsaturated polyester resin (UPR) should not be located in the same spill containment area or drainage path of other Class I or Class II liquids \[FP < 140°F (60°C)\], unless protected as required for such other liquids.
(3) Both \(\frac{1}{2}\) in. (20 mm) and 2 in. (50 mm) listed and labeled pressure-relieving devices are required on containers that exceed 6 gal (23 L) capacity.

66.16.5.2.12
Table 66.16.5.2.12 shall apply to the following:
(1) Automatic sprinkler protection
(2) Palletized or stacked storage
(3) Miscible liquids with concentration of ignitable (flammable or combustible) flammable or combustible components no greater than 80 percent by volume
(4) Glass or plastic containers

Table 66.16.5.2.12 Design Criteria for Sprinkler Protection of Palletized or Stacked Storage of Miscible Ignitible (Flammable or Combustible) Liquids in Glass or Plastic Containers
For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft$^2$ = 0.09 m$^2$, 1 gpm/ft$^2$ = 40.7 L/min/m$^2$ = 40.7 mm/min.
For definitions of abbreviations used in the Response column, see 66.16.5.1.9(4). (See also 66.16.5.1.9(5).)

66.16.6.1 Fire Protection System Design Scheme “A.”
66.16.6.1.1
Horizontal barriers of plywood having a minimum thickness of 1/4 in. (10 mm) or of sheet metal of minimum 22 gauge thickness shall be installed in accordance with Figure 66.16.6.1.1(a), Figure 66.16.6.1.1(b), or Figure 66.16.6.1.1(c), whichever is applicable. All ignitible (flammable or combustible) liquid storage shall be located beneath a barrier. All ignitible (flammable or combustible) liquid storage shall be located beneath a barrier. [See also 66.16.6.1.9 for liquids with flash points equal to or greater than 450°F (230°C).] [30:16.6.1.1]

Figure 66.16.6.1.1(a) Single-Row Rack Sprinkler Layout for Design Scheme “A.” [30:Figure 16.6.1.1(a)]
***INSERT FIGURE***

Figure 66.16.6.1.1(b) Double-Row Rack Sprinkler Layout for Design Scheme “A.” [30:Figure 16.6.1.1(b)]
***INSERT FIGURE***

Figure 66.16.6.1.1(c) Multiple-Row Rack Sprinkler Layout for Design Scheme “A.” [30:Figure 16.6.1.1(c)]
***INSERT FIGURE***

66.16.6.1.5 *
Where adjacent rack bays are not dedicated to storage of ignitible (flammable or combustible) liquids, the barrier and in-rack sprinkler protection shall be extended at least 8 ft (2.4 m) beyond the area devoted to ignitible (flammable or combustible) liquid storage. In addition, barrier and in-rack sprinkler protection shall be provided for any rack across the aisle within 8 ft (2.4 m) of the perimeter of the ignitible (flammable or combustible) liquid storage in accordance with 66.16.6.1. [30:16.6.1.5]

66.16.6.1.8
Ceiling sprinklers shall meet the following requirements:

1. Ceiling sprinkler protection shall be designed to protect the surrounding occupancy.
2. Any sprinkler type shall be acceptable.
3. If standard spray sprinklers are used, they shall be capable of providing not less than 0.20 gpm/ft² over 3000 ft² (8 mm/min over 270 m²).
4. If the ignitible (flammable or combustible) liquid storage does not extend to the full height of the rack, protection for commodities stored above the top horizontal barrier shall meet the requirements of Section 13.3 and NFPA 13 for the commodities stored, based on the full height of the rack. [30:16.6.1.8]

66.16.6.2 Fire Protection System Design Scheme “B.”

66.16.6.2.1
Horizontal barriers of plywood having a minimum thickness of 1/4 in. (10 mm) or of sheet metal of minimum 22 gauge thickness shall be installed in accordance with Figure 66.16.6.2.1(a), Figure
66.16.6.2.1(b), or Figure 66.16.6.2.1(c), whichever is applicable. All ignitible (flammable or combustible) liquid storage shall be located beneath a barrier. [30:16.6.2.1]

Figure 66.16.6.2.1(a) Single-Row Rack Sprinkler Layout for Design Scheme “B” — Sprinklers in Center of Rack. [30: Figure 16.6.2.1(a)]

Figure 66.16.6.2.1(b) Single-Row Rack Sprinkler Layout for Design Scheme “B” — Sprinklers on Face of Rack. [30: Figure 16.6.2.1(b)]

Figure 66.16.6.2.1(c) Double-Row Rack Sprinkler Layout for Design Scheme “B.” [30: Figure 16.6.2.1(c)]

66.16.6.2.4
In-rack sprinklers shall meet the following requirements:

1. In-rack sprinklers shall be ordinary temperature–rated quick-response sprinklers and shall have a nominal K-factor equal to or greater than 8.0. Intermediate-temperature sprinklers shall be used where ambient conditions require.

2. In-rack sprinklers shall be installed below each barrier level.

3. For containers that do not exceed 60 gal (230 L) capacity, in-rack sprinklers shall provide a minimum discharge flow of 57 gpm (220 L/min) out of each of the hydraulically most remote six sprinklers (six on one line or three on two lines) if one barrier level is provided, or out of each of the hydraulically most remote eight sprinklers (eight on one line or four on two lines on the same level), if two or more barrier levels are provided. The minimum in-rack sprinkler discharge pressure shall not be less than a gauge pressure of 10 psi (0.69 bar).

4. For containers that exceed 60 gal (230 L) capacity, but do not exceed 793 gal (3000 L), in-rack sprinklers shall provide a minimum discharge flow of 57 gpm (220 L/min) out of each of the hydraulically most remote 12 sprinklers (12 on one line or six on two lines on the same level). The minimum in-rack sprinkler discharge pressure shall not be less than a gauge pressure of 10 psi (0.69 bar).

[30:16.6.2.4]

66.16.6.2.5
If there are adjacent rack bays that are not dedicated to storage of ignitible (flammable or combustible) liquids, the barrier and in-rack sprinkler protection shall be extended beyond the area devoted to ignitible (flammable or combustible) liquid storage as follows:

1. For containers that do not exceed 1 gal (3.8 L) capacity, protection shall be extended at least 8 ft (2.4 m) beyond the area devoted to ignitible (flammable or combustible) liquid storage. In addition, adjacent racks across the aisles on each side of the ignitible (flammable or
combustible) liquid storage shall be protected in accordance with Section 13.3 and NFPA 13 for the commodity stored.

(2) For containers that exceed 1 gal (3.8 L) capacity, but do not exceed 793 gal (3000 L), protection shall be extended at least 8 ft (2.4 m) beyond the area devoted to ignitible (flammable or combustible) liquid storage. In addition, protection shall be provided for any rack across the aisle within 8 ft (2.4 m) of the perimeter of the ignitible (flammable or combustible) liquid storage in accordance with 66.16.6.2.

[30:16.6.2.5]

66.16.6.2.6

Ceiling sprinklers for containers that do not exceed 1 gal (3.8 L) capacity shall meet the following requirements:

(1) Ceiling sprinklers shall be designed to protect the surrounding occupancy.

(2) Ceiling sprinkler water demand shall not be included in the hydraulic calculations for the in-rack sprinkler protection.

(3) Water demand at the point of supply shall be calculated separately for in-rack and ceiling sprinklers and shall be based on the greater of the two.

(4) Any sprinkler type shall be acceptable for the ceiling sprinkler protection.

(5) If standard spray sprinklers are used, they shall be capable of providing not less than 0.20 gpm/ft² over 3000 ft² (8 L/min over 270 m²).

(6) If the ignitible (flammable or combustible) liquid storage does not extend to the full height of the rack, protection for commodities stored above the top horizontal barrier shall meet the requirements of Section 13.3 and NFPA 13 for the commodities stored, based on the full height of the rack.

[30:16.6.2.6]

66.16.6.3 Fire Protection System Design Scheme “C.”

66.16.6.3.1

Horizontal barriers of plywood having a minimum thickness of 1/4, in. (10 mm) or of sheet metal of minimum 22 gauge thickness shall be installed in accordance with Figure 66.16.6.3.1(a), Figure 66.16.6.3.1(b), or Figure 66.16.6.3.1(c), whichever is applicable. All ignitible (flammable or combustible) liquid storage shall be located beneath a barrier. [30:16.6.3.1]

Figure 66.16.6.3.1(a) Single-Row Rack Sprinkler Layout for Design Scheme “C.” [30:Figure 16.6.3.1(a)]

****INSERT FIGURE****

Figure 66.16.6.3.1(b) Double-Row Rack Sprinkler Layout for Design Scheme “C.” [30:Figure 16.6.3.1(b)]

****INSERT FIGURE****

Figure 66.16.6.3.1(c) Multiple-Row Rack Sprinkler Layout for Design Scheme “C.” [30:Figure 16.6.3.1(c)]

****INSERT FIGURE****
66.16.6.3.4
If there are adjacent bays of in-rack arrays that are not dedicated to storage of ignitable (flammable or combustible) liquids, the barrier and in-rack sprinkler protection shall be extended at least 8 ft (2.4 m) beyond the area devoted to ignitable (flammable or combustible) liquid storage. [30:16.6.3.4]

66.16.6.3.7
Ceiling sprinklers shall meet the following requirements:
(1) Ceiling sprinkler protection shall be designed to protect the surrounding occupancy.
(2) Any sprinkler type shall be acceptable.
(3) If standard spray sprinklers are used, they shall be capable of providing not less than 0.20 gpm/ft² over 3000 ft² (8 mm/min over 270 m²).
(4) If the ignitable (flammable or combustible) liquid storage does not extend to the full height of the rack, protection for commodities stored above the top horizontal barrier shall meet the requirements of Section 13.3 and NFPA 13 for the commodities stored, based on the full height of the rack.
[30:16.6.3.7]

66.16.6.4 Fire Protection System Design Scheme “D.”

66.16.6.4.1
In-rack sprinklers shall meet the following requirements:
(1) In-rack sprinklers shall be installed in accordance with Figure 66.16.6.4.1(a) or Figure 66.16.6.4.1(b), whichever is applicable.
(2) In-rack sprinklers shall be ordinary-temperature-rated, quick-response sprinklers.
(3) In-rack sprinklers shall have a K-factor of 8.0 (115).
(4) In-rack sprinklers shall provide a minimum discharge flow of 30 gpm (113 L/min) out of the hydraulically most remote:
   (a) Eight sprinklers on one level if one level of in-racks (8 total)
   (b) Seven sprinklers on two levels if two or more levels of in-racks (14 total)
[30:16.6.4.1]

Figure 66.16.6.4.1(a) Single-Row Rack Sprinkler Layout for Design Scheme “ED.” [30:16.6.4.1(a)]
****INSERT FIGURE****

Figure 66.16.6.4.1(b) Double-Row Rack Sprinkler Layout for Design Scheme “ED.” [30:16.6.4.1(b)]
****INSERT FIGURE****

66.16.6.4.2
If there are adjacent bays of in-rack arrays that are not dedicated to ignitable (flammable or combustible) storage of liquids, in-rack sprinkler protection shall be extended at least 8 ft (2.4 m) beyond the area devoted to ignitable (flammable or combustible) liquid storage. [30:16.6.4.2]
66.16.6.4.3
Ceiling sprinklers shall be designed to provide a minimum density of 0.3 gpm/ft² (12.2 mm/min) over the most remote 2000 ft² (185 m²) using ordinary-temperature-rated, standard-response spray sprinklers, having a nominal K-factor of 8.0 or 11.2. [30:16.6.4.3]

66.16.6.4.4
The ceiling and in-rack sprinkler water demands shall be balanced at the point of connection to the water supply. [30:16.6.4.4]

66.16.6.4.5
A 500 gpm (1890L/min) hose stream allowance shall be provided. [30:16.6.4.5]

66.16.6.6 66.16.6.5 Fire Protection System Design Scheme “E.”

66.16.6.4.166.16.6.5.1
Sprinklers and horizontal barriers shall be installed in accordance with Figure 66.16.6.4.1(a) or Figure 66.16.6.4.1(b), whichever is applicable. Horizontal barriers shall be of plywood having a minimum thickness of $\frac{3}{8}$ in. (10 mm) or of sheet metal of minimum 22 gauge thickness shall be installed in accordance with Figure 66.16.6.4.1(a) or Figure 66.16.6.4.1(b), whichever is applicable. All liquid storage shall be located beneath a barrier. [30:16.6.5.1]

66.16.6.5.2
All ignitable (flammable or combustible) liquid storage shall be located beneath a barrier. [30:16.6.5.2]

66.16.6.4.266.16.6.5.3
Vertical baffles shall not be installed between in-rack sprinklers. [30:16.6.5.3]

66.16.6.4.366.16.6.5.4
In-rack sprinklers shall meet the following requirements:

1. In-rack sprinklers shall be intermediate temperature-rated, pendent sprinklers with a nominal K-factor of 25.2, RTI of 50 (m/sec)$^{1/2}$ or less, and shall be listed as extended coverage control mode density/area storage sprinklers.

2. In-rack sprinklers shall be positioned in a transverse flueinstalled below each barrier level.

3. In-rack sprinklers shall not be positioned within 3.5 ft (1 m) of a rack upright.

4. The minimum in-rack sprinkler discharge pressure shall not be less than a gauge pressure of 30 psi (207 kPa).

5. Where one level of in-rack sprinklers is installed, the design shall include the four most hydraulically remote sprinklers (i.e., on a four on one line)-single line.
Where two levels of in-rack sprinklers are installed, the design shall include the three most hydraulically remote sprinklers on each level, and the two most hydraulically remote sprinklers on the next adjacent level.

Where three or more levels of in-rack sprinklers are installed, the design shall include the three most hydraulically remote sprinklers on the top three levels, a single line, and the two most hydraulically remote sprinklers on the next two adjacent levels.

Foam-water sprinkler protection shall be permitted to be substituted for water sprinkler protection, provided the same design criteria is used, and that the sprinkler is listed for use with foam.

**6.6.6.4.35.4**

If there are adjacent bays of in-rack arrays that are not dedicated to storage of ignitable (flammable or combustible) liquids, the barrier and in-rack sprinkler protection shall be extended at least 68 ft (2.41.8 m) beyond the area devoted to ignitable (flammable or combustible) liquid storage.

**6.6.6.4.55.4**

Ceiling sprinkler demand shall not be included in the hydraulic calculations for in-rack sprinklers where standard-response sprinklers are used for ceiling-level protection.

**6.6.6.4.65.7.1**

Water demand at point of supply shall be calculated separately for in-rack and ceiling sprinklers.

**6.6.6.4.65.7.2**

Water demand shall be based on the greater demand between in-rack and ceiling sprinklers.

**6.6.6.4.766.16.6.5.8**

Ceiling sprinklers shall meet the following requirements:

1. Ceiling sprinkler protection shall be designed to protect the surrounding occupancy.
2. Any sprinkler type shall be acceptable.
3. If standard spray sprinklers are used, they shall be capable of providing not less than 0.30 gpm/ft² over 3000 ft² (8 mm/min over 270 m²) when supplied with water. Design area can be reduced to 2000 ft² when using a preprimed foam-water system installed in accordance with NFPA 16 and maintained in accordance with NFPA 25.
4. If the ignitable (flammable or combustible) liquid storage does not extend to the full height of the rack, protection for commodities stored above the top horizontal barrier shall meet the requirements of NFPA 13 for the commodities stored, based on the full height of the rack.
A.66.16.6.5.8(3)
Design area can be reduced to 2000 ft² when using a preprimed foam-water system installed in accordance with NFPA 16 and maintained in accordance with NFPA 25. [30:A.16.6.5.8(3)]

66.16.6.4.866.16.6.5.9
A 500 gpm (1900 L/min) hose stream allowance shall be provided. [30:16.6.5.9]

66.16.6.6 Fire Protection System Design Scheme “F.”

66.16.6.6.1
In-rack sprinklers shall meet the following requirements:

(1) In-rack sprinklers shall be ordinary temperature-rated, quick-response sprinklers.
(2) In-rack sprinklers shall have a K-factor of 8.0 (115) or 11.2 (160).
(3) In-rack sprinklers shall be installed on 20 ft (6 m) vertical increments in accordance with Figure 66.16.6.6.1(a) and Figure 66.16.6.6.1(b) with the in-rack pattern shown in Figure 66.16.6.6.1(b) repeated from rack face to rack face for multiple-row racks.
(4) In-rack sprinklers shall provide a minimum discharge flow of 30 gpm (110 L/min) out of the hydraulically most remote sprinkler as follows:
   (a) Six in-rack sprinklers on one level if one level of in-racks (6 total)
   (b) Six in-rack sprinklers on two levels if two levels of in-racks (12 total)
   (c) Six in-rack sprinklers on three levels if three or more levels of in-racks (18 total)

Figure 66.16.6.6.1(a) Single-Row Rack Sprinkler Layout for Design Scheme “F.” [30:16.6.6.1(a)]
****INSERT FIGURE****

Figure 66.16.6.6.1(b) Double-Row Rack Sprinkler Layout for Design Scheme “F.” (Multiple row racks shall extend the same sprinkler pattern through the rack.) [30:16.6.6.1(b)]
****INSERT FIGURE****

66.16.6.6.2
If there are adjacent bays of rack storage that are not dedicated to ignitible (flammable or combustible) liquid storage, the in-rack sprinkler protection shall be extended at least 8 ft (2.4 m) beyond the area devoted to ignitible (flammable or combustible) liquid storage. [30:16.6.6.2]

66.16.6.6.3
The ceiling and in-rack sprinkler demands shall be balanced at the point of connection to the water supply. [30:16.6.6.3]

66.16.6.6.4
A 500 gpm (1890L/min) hose stream allowance shall be provided. [30:16.6.6.4]
66.16.6.5

A 1-hour duration shall be provided for the fire protection water demand. [30:16.6.6.5]

66.16.6.7 In-Rack Sprinkler Layouts for Table 66.16.5.2.8.

Where indicated in Table 66.16.5.2.8 and Table 66.16.5.2.16, in-rack sprinklers shall be installed as follows:

1. Where Layout 7 is required, in-rack sprinklers shall be installed in accordance with Figure 66.16.6.57(a).
2. Where Layout 8 is required, in-rack sprinklers shall be installed in accordance with Figure 66.16.6.57(b) or Figure 66.16.6.57(c).
3. Where Layout 9 is required, in-rack sprinklers shall be installed in accordance with Figure 66.16.6.57(d), or Figure 66.16.6.57(e), whichever is applicable.

Figure 66.16.6.75(a) Double-Row Rack Sprinkler Layout G7. [30:Figure 16.6.75(a)]

****INSERT FIGURE****

Figure 66.16.6.75(b) Double-Row Rack Sprinkler Layout 8I — Option #1. [30:Figure 16.6.57(b)]

****INSERT FIGURE****

Figure 66.16.6.75(c) Double-Row Rack Sprinkler Layout I8 — Option #2. [30:Figure 16.6.57(c)]

****INSERT FIGURE****

Figure 66.16.6.75(d) Double-Row Rack Sprinkler Layout H9 — Option #1. [30:Figure 16.6.57(d)]

****INSERT FIGURE****

Figure 66.16.6.75(e) Double-Row Rack Sprinkler Layout H9 — Option #2. [30:Figure 16.6.75(e)]

****INSERT FIGURE****

66.16.7 Water Supply.

Water supplies for automatic sprinklers, other water-based protection systems, hose streams, and hydrants shall be capable of supplying the anticipated water flow demand for a minimum of 2 hours. [30:16.7]

66.16.8.1

Containment or containment and drainage shall be provided in accordance with Figure 66.16.8.1, when protection systems are installed in accordance with the provisions of this section. [30:16.8.1]

Figure 66.16.8.1 Spill Containment and Liquid Spread Control for Protected Storage. [30:Figure 16.8.1]

****INSERT FIGURE****

A.66.16.8.2
Subsection 66.16.8 requires that control of liquid spread be provided to prevent a pool fire on the floor from spreading and opening more sprinkler heads than the design of the sprinkler system anticipates. For example, if the sprinkler system is designed to provide 0.45 gpm/ft² over 3000 ft² (18 mm/min over 280 m²), 66.16.8.2 requires that the spread of liquid also be limited to 3000 ft² (280 m²). Various means are available to achieve this control. [30:A.16.8.2]

Typical methods use trench or spot drains that divide the floor of the storage area into rectangles having areas equal to or less than the design area of the sprinkler system. Drains are centered under racks, and the floor is sloped toward the drain trenches with a minimum slope of 1 percent. The floor is made highest at the walls. See Figure A.66.16.8.2(a) and Figure A.66.16.8.2(b). Trenches are arranged as described in NFPA 15 and as shown in Figure A.66.16.8.2(c). Note particularly the dimensions of the trenches, and note that the solid covering spans one-third of the width on either side of the open grate and the open grate spans the middle third. Spot drains can be similarly arranged. Another method, shown in Figure A.66.16.8.2(d), uses spot drains located at building columns, where the area between any four columns does not exceed the design area of the sprinkler system. The floor is sloped to direct water flow to the drains. [30:A.16.8.2]

Connections to the drains are provided at trapped sumps, arranged as described in NFPA 15. See Figure A.66.16.8.2(e). To provide a safety factor, the drain pipes are sometimes sized to carry 150 percent of anticipated sprinkler discharge. The following equation can be used to calculate the flow of the drain pipe:

\[ F = 1.5DA \]

where:
- \( F \) = flow (gpm or L/min)
- \( D \) = sprinkler design density (gpm/ft² or L/min/m²)
- \( A \) = sprinkler design area (ft² or m²)

[30:A.16.8.2]

Additional information can be found in *Guidelines for Safe Warehousing of Chemicals*, Center for Chemical Process Safety, American Institute of Chemical Engineers. [30:A.16.8.2]
66.17.1.1  
This section shall apply where the processing of ignitible (flammable or combustible) liquids is the principal activity, except as covered elsewhere in this Code or in other NFPA standards. (See 66.1.4.)

66.17.1.2  
Provisions of this section shall not prohibit the use of movable tanks for the dispensing of ignitible (flammable or combustible) liquids into fuel tanks of motorized equipment outside on premises not accessible to the public, where such use has the approval of the AHJ.

66.17.3.1  
Ignitible (flammable or combustible) liquid processing operations shall be located and operated so that they do not constitute a significant fire or explosion hazard to life, to property of others, or to important buildings or facilities within the same plant.

66.17.3.2  
Specific requirements shall depend on the inherent risk in the operations themselves, including the ignitible (flammable or combustible) liquids being processed, operating temperatures and pressures, and the capability to control any ignitible (flammable or combustible) liquid or vapor releases or fire incidents that could occur.

66.17.3.6  
Processing and handling of Class II and Class III liquids \( \text{FP} \geq 100^\circ\text{F (37.8°C)} \) heated at or above their flash point shall follow the requirements for Class I liquids \( \text{FP} < 100^\circ\text{F (37.8°C)} \), unless an engineering evaluation conducted in accordance with Section 66.6 justifies following the requirements for some other liquid class. (See 66.6.4.1.2 and A.66.6.4.1.2.)

66.17.3.7  
When a process heats an ignitible (flammable or combustible) liquid to a temperature at or above its flashpoint, the following shall apply:

1. The process vessel shall be closed to the room in which it is located and vented to the outside of the building.
2. If the vessel needs to be opened to add ingredients, the room ventilation shall meet the requirements of 66.17.11 and the process heating controls will be interlocked with the ventilation such that the process heat will shut down if the ventilation fails or is turned off.
(3) The process vessel shall be equipped with an excess temperature control set to limit excessive heating of the ignitible (flammable or combustible) liquid and the subsequent release of vapors.

(4) If a heat transfer medium is used to heat the ignitible (flammable or combustible) liquid and the heat transfer fluid can heat the ignitible (flammable or combustible) liquid to its boiling point on failure of the process and excess temperature heat controls, a redundant excess temperature control shall be provided.

[30:17.3.7]

66.17.4 Location of Process Vessels and Equipment.

66.17.4.1 Ignitible (flammable or combustible) liquid-processing vessels and equipment shall be located in accordance with the requirements of this section. [30:17.4.1]

66.17.4.3 The minimum distance of a processing vessel to a property line that is or can be built upon, including the opposite side of a public way; to the nearest side of a public way; or to the nearest important building on the same property shall be determined by one of the following:

(1) In accordance with Table 66.17.4.3

(2) In accordance with an engineering evaluation of the process, followed by application of sound fire protection and process engineering principles

[30:17.4.3]

Table 66.17.4.3 Location of Process Vessels with Respect to Property Lines, Public Ways, and the Nearest Important Building on the Same Property — Protection for Exposures Is Provided

<table>
<thead>
<tr>
<th>Vessel Maximum Operating Liquid Capacity (gal)</th>
<th>From Property Line that Is or Can Be Built upon, Including Opposite Side of Public Way</th>
<th>From Nearest Side of Any Public Way or from Nearest Important Building on Same Property that Is Not an Integral Part of the Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable Liquid Emergency Relief*</td>
<td>Unstable Liquid Emergency Relief*</td>
<td>Stable Liquid Emergency Relief*</td>
</tr>
<tr>
<td>Not Over 2.5 psi</td>
<td>Over 2.5 psi</td>
<td>Not Over 2.5 psi</td>
</tr>
</tbody>
</table>

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### Table 66.17.6.1 Minimum Separation Distances for Buildings or Structures Used for Ignitible (Flammable or Combustible) Liquid Handling and Operations

<table>
<thead>
<tr>
<th>Liquid Class</th>
<th>Minimum Type of Construction*</th>
<th>To Street, Alley, or Public Way</th>
<th>To Adjacent Property Line that Is or Can Be Built Upon</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIA (222)</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

*Gauge pressure. [30: Table 17.4.3]

For SI units, 1 gal = 3.8 L; 1 ft = 0.3 m; 1 psi = a gauge pressure of 6.9 kPa.

Note: Double all of above distances where protection for exposures is not provided.

66.17.4.3.1

Processing vessels used solely to process stable Class IIB liquids [FP ≥ 200°F (93°C)] shall be located in accordance with Table 22.4.1.6 of NFPA 30. [30:17.4.3.1]

66.17.4.6 *

Ignitible (flammable or combustible) liquid-processing equipment, such as pumps, heaters, filters, and exchangers, shall not be located closer than 25 ft (7.6 m) to property lines where the adjoining property is or can be built upon or to the nearest important building on the same property that is not an integral part of the process. This spacing requirement shall be permitted to be waived where exposures are protected in accordance with 66.17.4.3. [30:17.4.6]

66.17.5 Accessibility.

Each process unit or building containing ignitible (flammable or combustible) liquid-processing equipment shall be accessible from at least one side for fire fighting and fire control. [30:17.5]

66.17.6.1

Process buildings or structures used for ignitible (flammable or combustible) liquid operations shall be constructed consistent with the operations being conducted and with the classes of liquids handled. They shall be constructed to minimum Type II (000) construction, as defined in NFPA 5000, and shall be constructed in accordance with Table 66.17.6.1. [30:17.6.1]
Class I liquids [FP < 100°F (37.8°C)]; unstable liquids of any class; liquids of any class heated above their flash points†

<table>
<thead>
<tr>
<th>Class</th>
<th>FP Range</th>
<th>I (111)</th>
<th>5</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>II (000)</td>
<td>10</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Class II liquids [100°F (37.8°C) ≤ FP < 140°F (60°C)]

<table>
<thead>
<tr>
<th>Class</th>
<th>FP Range</th>
<th>I (111)</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>II (000)</td>
<td>5</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Class III [FP ≥ 140°F (60°C)]

<table>
<thead>
<tr>
<th>Class</th>
<th>FP Range</th>
<th>I (000)</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
</table>

For SI units, 1 ft = 0.3 m.

Note: Distances apply to properties that have protection for exposures, as defined in this code. If there are exposures for which protection does not exist, the distances should be doubled, in accordance with 66.17.6.3.

*Construction types are defined in NFPA 220. [30: Table 17.6.1]
†For stable liquids of any class heated above their flash points, see 66.6.4.1.2 and A.66.6.4.1.2.1.

66.17.6.5
Buildings or structures used solely for blending, mixing, or dispensing of Class IIIB liquids [FP ≥ 200°F (93°C)] at temperatures below their flash points shall be permitted to be constructed of combustible construction, subject to the approval of the AHJ. [30:17.6.5]

66.17.6.6
Buildings or structures used for processing or handling of ignitable (flammable or combustible) liquids where the quantities of ignitable (flammable or combustible) liquids do not exceed 360 gal (1360 L) of Class I and Class II liquids [FP < 140°F (60°C)] and 720 gal (2725 L) of Class IIIA liquids [140°F (60°C) ≤ FP < 200°F (93°C)] shall be permitted to be constructed of combustible construction, subject to the approval of the AHJ. [30:17.6.6]

66.17.6.7
Buildings or structures used for processing or handling of ignitable (flammable or combustible) liquids protected with automatic sprinklers or equivalent fire protection systems shall be permitted to be constructed of combustible construction, subject to the approval of the AHJ. [30:17.6.7]

66.17.6.8 *
Load-bearing building supports and load-bearing supports of vessels and equipment capable of releasing quantities of ignitable (flammable or combustible) liquids that could result in a fire capable of causing substantial property damage shall be protected by one or more of the following:

1. Drainage to a safe location to prevent ignitable (flammable or combustible) liquids from accumulating under vessels or equipment or around load-bearing supports
2. Fire-resistive construction
3. Fire-resistant protective coatings or systems
4. Water spray systems designed and installed in accordance with NFPA 15
5. Other alternate means acceptable to the AHJ

[30:17.6.8]
66.17.6.9
Class I liquids [FP < 100°F (37.8°C)] shall not be handled or used in basements. [30:17.6.9]

66.17.6.9.1
Where Class I liquids [FP < 100°F (37.8°C)] are handled or used above grade within buildings with basements or closed pits into which flammable vapors can travel, such belowgrade areas shall be provided with mechanical ventilation designed to prevent the accumulation of flammable vapors. [30:17.6.9.1]

66.17.6.9.2
Means shall be provided to prevent ignitable (flammable or combustible) liquid spills from running into basements. [30:17.6.9.2]

66.17.6.13
Indoor areas where Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)], or unstable liquids, or other liquids intentionally heated to or above their BP are in use shall be designed to direct flame, combustion gases, and pressures resulting from a deflagration away from important buildings or occupied areas through the use of damage-limiting construction in accordance with NFPA 68. [30:17.6.13]

66.17.6.13.1
The damage-limiting construction design shall be in accordance with recognized standards and shall be acceptable to the AHJ, both of the following: (See A.66.9.15.1.)

1) In accordance with recognized standards
2) Acceptable to the AHJ
[30:17.6.13.1]

66.17.6.13.2
Where unstable liquids are in use, an approved engineered construction method that is designed to limit damage from an explosion (i.e., deflagration or detonation, depending on the characteristics of the liquid) shall be used. [30:17.6.13.2]

66.17.10.1 *
A facility shall be designed and operated to prevent the discharge of ignitable (flammable or combustible) liquids to public waterways, public sewers, or adjoining property. [30:17.10.1]

66.17.10.2
Emergency drainage systems shall be provided to direct ignitable (flammable or combustible) liquid leakage and fire protection water to a safe location. [30:17.10.2]

66.17.11.8
Where equipment such as dispensing stations, open centrifuges, plate and frame filters, and open
vacuum filters is used in a building, the equipment and ventilation of the building shall be designed to
limit flammable vapor–air mixtures under normal operating conditions to the interior of equipment and
to not more than 5 ft (1.5 m) from equipment that exposes Class I liquids \( [FP < 100°F (37.8°C)] \) to the air. \[30:17.11.10\]

66.17.14 *Process Equipment and Vessels.*

Equipment shall be designed and arranged to prevent the unintentional escape of ignitible (flammable
or combustible) liquids and vapors and to minimize the quantity escaping in the event of accidental
release. \[30:17.14\]

66.17.15.1

This section shall apply to the management methodology used to identify, evaluate, and control the
hazards involved in processing and handling of ignitible (flammable or combustible) flammable and
combustible liquids. These hazards include, but are not limited to, preparation; separation; purification;
and change of state, energy content, or composition. \[30:17.15.1\]

66.17.15.2

Operations involving ignitible (flammable or combustible) flammable and combustible liquids shall be
reviewed to ensure that fire and explosion hazards resulting from loss of containment of ignitible
(flammable or combustible) liquids are provided with corresponding fire prevention and emergency
action plans. \[30:17.15.2\]

66.17.15.2.1

Exception No. 1: Operations where ignitible (flammable or combustible) liquids are used solely for on-
site consumption as fuels shall not be required to comply with 66.17.15.2. \[30:17.15.2.1\]

66.17.15.2.2

Exception No. 2: Operations where Class II or Class III liquids \( [FP > 100°F (37.8°C)] \) are stored in
atmospheric tanks or transferred at temperatures below their flash points shall not be required to
comply with 66.17.15.2. \[30:17.15.2.2\]

66.17.15.2.3

Exception No. 3: Mercantile occupancies, crude petroleum exploration, drillings, and well servicing
operations, and normally unoccupied facilities in remote locations shall not be required to comply with
66.17.15.2. \[30:17.15.2.3\]

66.17.15.4

A written emergency action plan that is consistent with available equipment and personnel shall be
established to respond to fires and related emergencies. This plan shall include the following:

(1) Procedures to be followed in case of fire or release of ignitible (flammable or combustible)
    liquids or vapors, such as sounding the alarm, notifying the fire department, evacuating
    personnel, and controlling and extinguishing the fire
(2) Procedures and schedules for conducting drills of these procedures

(3) Appointment and training of personnel to carry out assigned duties, which shall be reviewed at the time of initial assignment, as responsibilities or response actions change, and whenever anticipated duties change

(4) Procedures for maintenance of the following:
   (a) Fire protection equipment and systems
   (b) Drainage and containment systems
   (c) Ventilation equipment and systems

(5) Procedures for shutting down or isolating equipment to reduce, control, or stop the release of ignitable (flammable or combustible) liquid or vapors, including assigning personnel responsible for maintaining critical plant functions or shutdown of plant processes and safe startup following isolation or shutdown

(6) Alternative measures for the safety of occupants

66.18 Dispensing, Handling, Transfer, and Use of Ignitable (Flammable or Combustible) Liquids.

66.18.1 Scope.
This section applies where ignitable (flammable or combustible) liquids are handled, dispensed, transferred, or used, including in process areas.

66.18.3 General Requirements.
Processing and handling of Class II and Class III liquids \([FP \geq 100^\circ F (37.8^\circ C)]\) heated at or above their flash point \(FP\) shall follow the requirements for Class I liquids \([FP < 100^\circ F (37.8^\circ C)]\), unless an engineering evaluation conducted in accordance with Section 66.6 justifies following the requirements for some other liquid class. \((See \ 66.6.4.1.2 \ and \ A.66.6.4.1.2.)\)

66.18.4.1
Class I liquids \([FP < 100^\circ F (37.8^\circ C)]\) shall be kept in closed tanks or containers when not actually in use. Class II and Class III liquids \([FP \geq 100^\circ F (37.8^\circ C)]\) shall be kept in closed tanks or containers when not actually in use when the ambient or process temperature is at or above their \(FP\) flash points.

66.18.4.2
Where ignitable (flammable or combustible) liquids are used or handled, provisions shall be made to promptly and safely mitigate and dispose of leakage or spills.

66.18.4.3
Class I liquids \([FP < 100^\circ F (37.8^\circ C)]\) shall not be used outside closed systems where there are open flames or other ignition sources within the classified areas set forth in Section 66.7.

66.18.4.4
Transfer of ignitable (flammable or combustible) liquids among vessels, containers, tanks, and piping...
systems by means of air or inert gas pressure shall be permitted only under all of the following conditions:

(1) The vessels, containers, tanks, and piping systems shall be designed for such pressurized transfer and shall be capable of withstanding the anticipated operating pressure.
(2) Safety and operating controls, including pressure-relief devices, shall be provided to prevent overpressure of any part of the system.
(3) Only inert gas shall be used to transfer Class I liquids \([\text{FP} < 100°F (37.8°C)]\). Only inert gas shall be used to transfer Class II and Class III liquids \([\text{FP} \geq 100°F (37.8°C)]\) that are heated above their flash points.

**66.18.4.4.1**

Dispensing of Class I liquids \([\text{FP} < 100°F (37.8°C)]\) from a container by means of air shall be permitted under the following conditions:

(1) The pressure shall be generated by means of a listed hand-operated device.
(2) Pressure shall not exceed a gauge pressure of 6 psi (41 kPa) and pressure relief shall be provided.
(3) The container shall not exceed 119 gal (450 L) and shall be capable of withstanding the maximum pressure generated by the device.
(4) The device shall be bonded and grounded or shall be demonstrated as not being capable of generating a static charge under any operating condition.
(5) The device shall be constructed of a material of construction of the device shall be compatible with the ignitable (flammable or combustible) liquid dispensed.

**66.18.4.8** *

The staging of ignitable (flammable or combustible) liquids in containers, intermediate bulk containers, and portable tanks shall be limited to the following:

(1) Containers, intermediate bulk containers, and portable tanks that are in use
(2) Containers, intermediate bulk containers, and portable tanks that were filled during a single shift
(3) Containers, intermediate bulk containers, and portable tanks needed to supply the process for one continuous 24-hour period
(4) Containers, intermediate bulk containers, and portable tanks that are stored in accordance with Section 66.9

**66.18.4.9**

Class I, Class II, or Class IIIA liquids \([\text{FP} < 200°F (93°C)]\) used in a process and staged in the process area shall not be filled in the process area. [30:18.4.9]

**66.18.4.9.1**

Exception No. 1: Intermediate bulk containers and portable tanks that meet the requirements of Section 66.9 shall be permitted to be filled in the process area. [30:18.4.9.1]
66.18.4.9.2
Exception No. 2: Intermediate products that are manufactured in the process area shall be permitted to be filled in the process area. [30:18.4.9.2]

66.18.5 Incidental Operations.

66.18.5.1 *
This section shall apply to areas where the use, handling, and storage of ignitable (flammable or combustible) liquids is only a limited activity to the established occupancy classification. [30:18.5.1]

A.66.18.5.1
Incidental operations are operations that utilize liquids only as a limited activity to that which establishes the occupancy classification. Examples include automobile assembly, assembly of electronic equipment, furniture manufacturing, and areas within refineries, distilleries, and chemical plants where the use of liquids is incidental, such as in maintenance shops, offices, or vehicle repair shops. Some more detailed descriptions follow:

(1) **Vehicle Assembly.** Vehicle assembly operations usually involve both process and incidental use of liquids. An example of a process operation would be paint storage and mixing utilized for application of the vehicle primer, color coats, and clear coats. For these operations, the requirements of Chapter 17 of NFPA 30 apply. Examples of incidental use would be sealer deck wipedown operations, windshield washer solvent dispensing, brake fluid filling, and final line paint repair operations. These operations might be continuous. However, the quantities of liquids used and the vapor exposures are significantly reduced from larger volume usage found within vehicle body component paint mixing and storage operations.

(2) **Assembly of Electrical Equipment.** Examples of incidental use of liquids in these types of occupancies might include “photoresist” coating operations, “softbaking” operations, wave solder operations, and wipedown operations.

(3) **Chemical Plant Maintenance Shop.** Incidental use of liquids is commonplace in maintenance shops located within a chemical plant. Examples are cutting oils used in a machine shop, Class II solvents for degreasing, and Class I and Class II paint solvents and fuels associated with automotive and industrial truck repair.

(4) **Cleaning and Sanitation.** Under provisions established by the U.S. Food and Drug Administration (FDA) in 21 CFR, “GMP for Medical Devices,” Class I and Class II liquids [FP < 140°F (60°C)] can be used for cleaning and sanitation purposes. Limited quantities are used to remove manufacturing materials, mold release compounds, and other contaminants not intended to be on the final product. An example would be the use of isopropyl alcohol (IPA), transferred to a cleaning wipe via a plunger-type liquid-dispensing container. The cleaning wipe is then used to remove manufacturing materials not intended to be on the final product. The key point here is not that the liquid is not part of the final product, but that limited quantities of liquid are used and the use is incidental to the manufacturing operation that produces the product.

[30:A.18.5.1]
66.18.5.2
Class I liquids $[FP < 100^\circ\text{F (37.8°C)}]$ or Class II and Class III liquids $[FP \geq 100^\circ\text{F (37.8°C)}]$ that are heated up to or above their flash points $FP$ shall be drawn from or transferred into vessels, containers, or portable tanks as follows:

1. From original shipping containers with a capacity of 5.3 gal (20 L) or less
2. From safety cans
3. Through a closed piping system
4. From portable tanks or containers by means of a device that has antisiphoning protection and that draws through an opening in the top of the tank or container
5. By gravity through a listed self-closing valve or self-closing faucet

[30:18.5.2]

66.18.5.2.3
Where pumps are used for ignitable (flammable or combustible) liquid transfer, means shall be provided to deactivate liquid transfer in the event of an ignitable (flammable or combustible) liquid spill or fire.

[30:18.5.2.3]

66.18.5.3
Storage of ignitable (flammable or combustible) liquids other than those governed by 66.18.5.4 and 66.18.5.5 shall comply with Section 66.9. [30:18.5.3]

66.18.5.4
The maximum allowable quantities (MAQs) of ignitable (flammable or combustible) liquids in containers in use in incidental operations in a control area shall not exceed the greater of the following:

1. The amount required to supply incidental operations for one continuous 24-hour period, provided the hazard analysis required in Section 66.6 accounts for these quantities
2. The aggregate sum of the quantities provided in Table 66.18.5.4

Table 66.18.5.4 MAQ of Flammable and Combustible Liquids Per Control Area for Incidental Operations

<table>
<thead>
<tr>
<th>Liquid Class(es)</th>
<th>Open Use — Gal</th>
<th>Open Use — L</th>
<th>Use — Closed Containers — Gal</th>
<th>Use — Closed Containers — L</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>10</td>
<td>38</td>
<td>30</td>
<td>115</td>
</tr>
<tr>
<td>IB and IC</td>
<td>30</td>
<td>115</td>
<td>120</td>
<td>460</td>
</tr>
<tr>
<td>II</td>
<td>30</td>
<td>115</td>
<td>120</td>
<td>460</td>
</tr>
<tr>
<td>IIIA</td>
<td>80</td>
<td>300</td>
<td>330</td>
<td>1,265</td>
</tr>
<tr>
<td>IIIB</td>
<td>3,300</td>
<td>12,650</td>
<td>13,200</td>
<td>50,600</td>
</tr>
</tbody>
</table>

#See 66.4.1 for details on the classification scheme.

Notes:
1. Quantities are permitted to be increased 100 percent where stored in approved Class I liquids $[FP < 100^\circ\text{F (37.8°C)}]$ flammable liquids storage cabinets or in safety cans. Where note (2) also applies, the increase for both notes is permitted to be applied accumulatively.
2) Quantities are permitted to be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system installed in accordance with NFPA 13. Where Note (1) also applies, the increase for both notes is permitted to be applied accumulatively.

[A.66.18.5.4]

66.18.5.4(1)
The intent of this requirement is to allow the quantities of flammable and combustible (ignitible) liquids needed to safely and efficiently operate for the actual operating hours in any 24-hour period. As an example, if the facility operates only 8 hours out of 24 (i.e., a single shift) and uses 50 gal (190 L) of liquid during that time, then 50 gal (190 L) is the allowable quantity for the continuous 24-hour period. If the facility increases operations to two shifts, then the allowable quantity doubles to 100 gal (380 L).

[66.18.5.4.1]

Where the quantities of ignitible (flammable or combustible) liquids in incidental operations are governed by 66.18.5.4(2), the aggregate quantity of liquids in storage and in use shall not exceed the maximum allowable quantity per control area in Section 66.9.

[66.18.5.4.2]

Control areas shall be in accordance with Section 66.9.

[66.18.5.5]

Where quantities of ignitible (flammable or combustible) liquids in excess of the limits in 66.18.5.4.1 are necessary, storage shall be in tanks that meet all applicable requirements of Section 66.17, Sections 66.21 through 66.25, and Section 66.27.

[66.18.5.6]

Areas in which ignitible (flammable or combustible) liquids are transferred from one tank or container to another container shall be provided with the following:

1) Separation from other operations where potential ignition sources are present by distance or by fire-resistant construction
2) Drainage or other means to control spills
3) Natural or mechanical ventilation that meets the requirements of 66.17.11

[66.18.6 Ventilation for Dispensing Areas.

66.18.6.1 Ventilation Type.

66.18.6.1.1 Liquid storage areas where dispensing is conducted shall be provided with either a gravity system or a continuous mechanical exhaust ventilation system.
Liquid storage areas where dispensing is conducted shall be provided with either a gravity system or a continuous mechanical exhaust ventilation system. Mechanical ventilation shall be used if Class I liquids [FP < 100°F (37.8°C)] are dispensed within the room. [30:18.6.1.2]

66.18.6.12
Exhaust air shall be taken from a point near a wall on one side of the room and within 12 in. (300 mm) of the floor, with one or more make-up inlets located on the opposite side of the room within 12 in. (300 mm) of the floor. [30:18.6.24]

66.18.6.266.18.6.3
The location of both the exhaust and inlet air openings shall be arranged to provide air movement across all portions of the floor to prevent accumulation of flammable vapors. [30:18.6.32]

66.18.6.366.18.6.4 *
Exhaust ventilation discharge shall be to a safe location outside the building. [30:18.6.43]

A.66.18.6.3A.66.18.6.4
A “safe location” should be selected as the location of a vent discharge to minimize the potential for ignitable vapors to travel to a source of ignition after discharge from the vent. Electrical equipment that does not meet the requirements for hazardous locations can serve as an ignition source. The Technical Committee advises that vent discharge locations should consider such factors such as the following:

1. Characteristics of the exhausted material (vapor density, toxicity, velocity of discharge, etc.)
2. Proximity to potential ignition sources
3. Building openings such as doors, windows, air intakes, and so forth
4. Dispersion characteristics (distance to discharge within the flammable range, direction of discharge, atmospheric conditions, and the influence of building and neighboring buildings on discharged vapors)
5. Likelihood of vapor accumulation following discharge, such as accumulation under building eaves
6. Likelihood of sufficient discharge volume to allow an ignitable concentration to reach an ignition source

Historically, NFPA 30 has provided prescriptive guidance, often based on area classification requirements, and results have been acceptable. Closer distances should be accepted only if an engineering study by a qualified engineer justifies closer distances. Similarly, the specified distances might not be acceptable for all installations, thus the guidance provided above. [30:A.18.6.44]

66.18.6.3.166.18.6.4.1
Recirculation of the exhaust air shall be permitted only when it is monitored continuously using a fail-safe system that is designed to automatically sound an alarm, stop recirculation, and provide full exhaust to the outside in the event that vapor-air mixtures in concentrations over one-fourth of the lower flammable limit are detected. [30:18.6.43.1]
66.18.6.5
If ducts are used, they shall not be used for any other purpose and shall comply with NFPA 91. [30:18.6.54]

66.18.6.5.1
If make-up air to a mechanical system is taken from within the building, the opening shall be equipped with a fire door or damper, as required in NFPA 91. [30:18.6.54.1]

66.18.6.5.2
For gravity systems, the make-up air shall be supplied from outside the building. [30:18.6.54.2]

66.18.6
Mechanical ventilation systems shall provide at least 1 cfm of exhaust air for each square foot of floor area (0.3 m³/min/m²), but not less than 150 cfm (4 m³/min). [30:18.6.6]

66.18.6.6.1
The mechanical ventilation system for dispensing areas shall be equipped with an airflow switch or other equally reliable method that is interlocked to sound an audible alarm upon failure of the ventilation system designed to provide an alarm notification upon loss of airflow. [30:18.6.65.1]

66.18.6.6.2
Dispensing operations shall be stopped upon loss or failure of the ventilation. [30:18.6.6.2]

66.19.1 Scope.
This section shall apply to the handling and use of flammable and combustible liquids in specific operations as herein described. [30:19.1]

66.19.2.1 *Cooking Oil.
Where used in this section, cooking oil shall be defined-classified as a Class IIIB combustible liquid [FP ≥ 200°F (93°C)]. This definition shall apply to both fresh, or new, cooking oil and waste, or used, cooking oil. [30:19.2.1]

A.66.19.2.1
Cooking oil is a Class IIIB liquid [FP ≥ 200°F (93°C)] with a high flash pointFP typically above 500°F (260°C). Because of its high flash pointFP, cooking oil presents a lower fire hazard than Class IIIB liquids [FP ≥ 200°F (93°C)] having flash pointsFP lower than 500°F (260°C). Fresh, or new, cooking oil is supplied to the user for cooking operations. As the oil becomes degraded through repeated use, it must be replaced with fresh oil. This waste, or used, cooking oil is recovered from the cooking appliance and temporarily stored for offsite removal. To maintain fluidity in the transfer process, the waste oil is heated to approximately 100°F (38°C), well below the flash pointFP temperature. [30:A.19.2.1]
A.66.19.4.3.1  
Heat transfer fluid systems have the potential for releasing large quantities of heated flammable or combustible (ignitible) liquids. Low-point drains piped to a safe location provide the ability to remove heat transfer fluid from a breached piping system in order to minimize the total quantity of fluid released. An engineering analysis should be used to determine the location and design of low-point drains. The engineering analysis should consider system inventory, the amount of heat transfer fluid that can be released in a specific fire area, the exposure created by a release, and the fire protection provided. [30:A.19.4.3.1]

66.19.5.2.1  
Tanks and equipment shall have independent venting for overpressure or vacuum conditions that could occur from malfunction of the vapor recovery or vapor processing system. [30:19.5.2.1]

66.19.5.2.2  
Exception: For tanks, venting of tanks shall comply with 66.21.4.3. [30:19.5.2.2]

66.19.5.4.1  
Vapor collection piping shall be designed to prevent trapping ignitible (flammable or combustible) liquid. [30:19.5.4.1]

66.19.5.4.2  
Vapor recovery and vapor processing systems that are not designed to handle ignitible (flammable or combustible) liquid shall be provided with a means to eliminate any ignitible (flammable or combustible) liquid that carries over to or condenses in the vapor collection system. [30:19.5.4.2]

66.19.5.5.1  
A liquid knock-out vessel used in the vapor collection system shall have means to verify the ignitible (flammable or combustible) liquid level and a high liquid level sensor that activates an alarm. [30:19.5.5.1]

66.19.5.5.2  
For unattended facilities, the high liquid level sensor shall initiate shutdown of ignitible (flammable or combustible) liquid transfer into the vessel and shutdown of vapor recovery or vapor processing systems. [30:19.5.5.2]

66.19.5.6.1  
Storage tanks served by vapor processing or vapor recovery systems shall be equipped with overfill protection in accordance with 66.21.7.1 of NFPA 30. [30:19.5.6.1]

66.19.5.7.1 Vapor Release.  
Tank or equipment openings provided for purposes of vapor recovery shall be protected against possible vapor release in accordance with 66.23.13.7 and 66.28.11.1.8.1 and 23.13.7 of NFPA 30. [30:19.5.7.1]
A.66.19.5.7.3
NFPA 77 and API RP-2003, *Protection Against Ignition Arising Out of Static, Lightning, and Stray Currents*, can be used as a reference for protections against static ignition. [30:A.19.5.7.3]

66.19.6.1.1
This section shall apply to solvent distillation units having distillation chambers or still pots that do not exceed 60 gal (227 L) nominal capacity and are used to recycle Class I, Class II, or Class IIIA liquids [FP < 200°F (93°C)]. [30:19.6.1.1]

66.19.7.1.3 *
Where there are conflicts between the requirements of this section and requirements of other sections of this Code, the requirements of this section shall take precedence. [30:19.7.1.3]

A.66.19.7.1.3
The goal of 66.19.7 is to consolidate in one location all requirements for commercial kitchen cooking oil storage and operations. There are a number of chapters in NFPA 30 that apply to these systems, including chapters on storage tanks and piping systems, transferring and dispensing of liquids, and so forth. Many of these requirements are more applicable to industrial or process situations and commercial kitchen cooking oil storage and use was not anticipated. All applicable chapters have been assessed in detail. Those specific requirements in this section that are in potential conflict with other sections of this Code have been identified, and alternate methods or exceptions have been developed where appropriate. This approach eliminates the need to add exceptions throughout the existing Code, improving ease of use particularly for fire officials. [30:A.19.7.1.3]

66.19.7.2.1 Materials of Construction.
Tanks shall be constructed of materials of metallic or nonmetallic construction. [30:19.7.2.1]

66.19.7.2.1.2 *
For tanks storing waste cooking oil, the materials of construction of the tanks and their appurtenances shall be constructed of materials compatible with cooking oil at a minimum temperatures of 140°F (60°C) continuous and 235°F (113°C) intermittent. [30:19.7.2.1.2]

A.66.19.7.2.1.2
Waste oil is drained from commercial cooking equipment via a transfer pump and transfer lines to a waste oil storage tank. The oil might be as hot as 375°F (190°C), still well below the oil’s Flash Point. Experience shows that the oil loses significant heat in the transfer process. The maximum temperature of waste cooking oil entering the storage tank is typically below 235°F (113°C). The storage tank should be constructed of materials compatible with cooking oil in that temperature range. [30:A.19.7.2.1.2]

A.66.19.7.2.2.1
Existing steel tanks listed for flammable and combustible (ignitible) flammable and combustible liquids...
are considered acceptable for waste oil use. These tank standards contain design and construction requirements that would not meet food code requirements, making the tanks unacceptable for storage of liquid food products (i.e., fresh cooking oil). [30:A.19.7.2.2.1]

**A.66.19.7.2.5**

Although generally not required for tanks storing Class IIIB liquids \([FP \geq 200°F (93°C)]\), overfill protection is considered necessary for cooking oil storage tanks to prevent inadvertent spillage. [30:A.19.7.2.5]

**66.19.7.3.2.3**

Where a tank is located in areas subject to flooding, the method for anchoring the tank to the floor shall be capable of preventing the tank, either full or empty, from floating during a rise in water level up to the established maximum flood stage. Engineering evaluation by a qualified, impartial outside agency shall be an acceptable method of meeting this requirement. [30:19.7.3.2.3]

**66.19.7.4.2**

In areas where tanks are located, no additional ventilation shall be required beyond that required necessary for comfort ventilation, and provided that all cooking equipment is provided equipped with exhaust systems in accordance with NFPA 96. [30:19.7.4.2]

**A.66.19.7.5.1**

Waste oil lines are generally pumped until there is little residual oil remaining in the lines. Fresh cooking oil lines are likely to contain residual oil after fill and removal operations. Restricting the fresh oil line size to 1.25 in. (32 mm) maximum inside diameter limits the amount of oil in the line. Additionally, the requirement for check valves or antisiphon valves on the lines at points where the lines connect to the tank eliminates the possibility of a compromised line siphoning the contents of the tank. To the extent possible, transfer lines should avoid being routed over seating areas. These requirements are designed to minimize fire risk by limiting cooking oil quantities in transfer lines that could become involved in a fire. In buildings protected by automatic fire sprinklers, the need to add sprinklers in previously unprotected spaces (assuming the transfer lines are located in these spaces) should be considered in accordance with the requirements of NFPA 13. [30:A.19.7.5.1]

**66.21 Storage of Ignitible (Flammable or Combustible) Liquids in Tanks — Requirements for All Storage Tanks.**

**66.21.1 Scope.**

This section shall apply to the following:

1. The storage of flammable and combustible liquids, as defined in 3.3.178.1 and 3.3.178.2 and Section 66.4, in fixed tanks that exceed 60 gal (230 L) capacity
2. The storage of flammable and combustible liquids in portable tanks that exceed 660 gal (2500 L) capacity
3. The storage of flammable and combustible liquids in intermediate bulk containers that exceed 793 gal (3000 L) capacity
The design, installation, testing, operation, and maintenance of such tanks, portable tanks, and bulk containers

66.21.3.1
Storage of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] heated at or above their flash point FP shall follow the requirements for Class I liquids [FP < 100°F (37.8°C)], unless an engineering evaluation conducted in accordance with Section 66.6 and 66.21.6 justifies following the requirements for some other liquid class. [30:21.3.1]

66.21.4.1.5 Combustible Materials.

66.21.4.1.5.1 Tanks shall be permitted to be constructed of combustible materials when approved. [30:21.4.1.5.1]

66.21.4.1.5.2 Tanks shall be permitted to be constructed of combustible materials when approved. Tanks constructed of combustible materials shall be limited to any of the following:

1. Underground installation
2. Use where required by the properties of the ignitable (flammable or combustible) liquid stored
3. Aboveground storage of Class IIIB liquids [FP ≥ 200°F (93°C)] in areas not exposed to a spill or leak of Class I or Class II liquids [FP < 140°F (60°C)]
4. Storage of Class IIIB liquids [FP ≥ 200°F (93°C)] inside a building protected by an approved automatic fire-extinguishing system

[30:21.4.1.5.2]

66.21.4.1.5.3*
Use of electrical immersion heaters in nonmetallic tanks shall be prohibited. [30:21.4.1.5.3]

A.66.21.4.1.5.3
Electrical immersion heaters pose a potential hazard to melt through plastic tanks and/or cause ignition. If these heaters are proposed for use in plastic tanks because of operational needs, a hazard analysis required by 6.4.1 should consider engineering controls such as, but not limited to, the following:

1. Low-liquid-level alarm
2. High-temperature alarm
3. Over-temperature and low-liquid-level automatic shutoff of the immersion heater

[30:A.21.4.1.5.3]

66.21.4.1.5.4
Exposed combustible components of nonmetallic tanks shall be spaced at least 3 ft (0.9 m) away from any surface heated to a temperature above 140°F (60°C) and at least 6 ft (1.8 m) away from any open flame. [30:21.4.1.5.4]

66.21.4.2.1.1 *
Atmospheric tanks shall be designed and constructed in accordance with any of the following recognized engineering standards. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 66.21.4.2.1:

1. API Specification 12B, Bolted Tanks for Storage of Production Liquids
2. API Specification 12D, Field Welded Tanks for Storage of Production Liquids
3. API Specification 12F, Shop Welded Tanks for Storage of Production Liquids
4. API Standard 650, Welded Tanks for Oil Storage
5. UL 58, Steel Underground Tanks for Flammable and Combustible Liquids
6. UL 80, Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids
7. UL 142, Steel Aboveground Tanks for Flammable and Combustible Liquids
8. UL 142A, Safety for Special Purpose Aboveground Tanks for Specific Flammable or Combustible Liquids
9. UL 1316, Glass-Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures
10. UL 1746, External Corrosion Protection Systems for Steel Underground Storage Tanks
11. UL 2080, Fire Resistant Tanks for Flammable and Combustible Liquids
12. UL 2085, Protected Aboveground Tanks for Flammable and Combustible Liquids
13. UL 2258, Aboveground Nonmetallic Tanks for Fuel Oil and Other Combustible Liquids, where used in accordance with the provisions in 66.21.4.1.5

[30:21.4.2.1.1]

A.66.21.4.2.1.1
Atmospheric tanks include tanks of compartmented design and tanks that incorporate secondary containment. [30:A.21.4.2.1.1]

For shop-fabricated steel generator base, work bench, lube oil, used oil, and day tanks, see UL 142A, Outline of Investigation for Special Purpose Aboveground Tanks for Specific Flammable or Combustible Liquids, covers shop-fabricated steel special-purpose generator base, work bench, lube oil, used oil, and day-tank types. [30:A.21.4.2.1.1]

66.21.4.2.1.2
Tanks shall be limited to operation from atmospheric to a gauge pressure of 0.5 psi (3.5 kPa) unless permitted in 66.21.4.2.1.3 and 66.21.4.2.1.5. [30:21.4.2.1.2]

66.21.4.2.1.2
Atmospheric tanks designed and constructed in accordance with Appendix F of API Standard 650, Welded Tanks for Oil Storage, shall be permitted to operate at pressures from atmospheric to a gauge pressure of 1.0 psi (6.9 kPa). All other tanks shall be limited to operation from atmospheric to a
gauge pressure of 0.5 psi (3.5 kPa) except as permitted in 66.21.4.2.1.3 and 66.21.4.2.1.4. [30:21.4.2.1.32]

66.21.4.2.1.3.1
Tanks shall be anchored as required by Annex F of API Standard 650, *Welded Tanks for Oil Storage*. [30:21.4.2.1.3.1]

66.21.4.2.1.4
Atmospheric tanks that are not designed and constructed in accordance with Appendix F of API Standard 650, *Welded Tanks for Oil Storage*, shall be permitted to operate at pressures from atmospheric to a gauge pressure of 1.0 psi (6.9 kPa) only if an engineering analysis is performed to determine that the tank can withstand the elevated pressure. [30:21.4.2.1.4]

66.21.4.2.1.54
Horizontal cylindrical and rectangular tanks built according to any of the standards specified in 66.21.4.2.1.1 shall be permitted to operate at pressures from atmospheric to a gauge pressure of 1.0 psi (6.9 kPa) and shall be limited to a gauge pressure of 2.5 psi (17 kPa) under emergency venting conditions. [30:21.4.2.1.54]

66.21.4.2.1.65
Low-pressure tanks and pressure vessels shall be permitted to be used as atmospheric tanks. [30:21.4.2.1.65]

66.21.4.2.1.76
Atmospheric tanks shall not be used to store an ignitible (flammable or combustible) liquid at a temperature at or above its boiling point. [30:21.4.2.1.76]

66.21.4.3.1 Storage Tank Venting.

66.21.4.3.1.1*
Storage tanks shall be vented to prevent the development of vacuum or pressure that can distort the tank or exceed the rated design vacuum or rated design pressure of the tank when the tank is filled or emptied or because of atmospheric temperature changes. [30:21.4.3.1.1]

A.66.21.4.3.1.1 A.66.21.4.3.2
Normal venting is not required for the interstitial space of a secondary containment tank. [30:A.21.4.3.1.12]

66.21.4.3.1.2
Normal vents shall be located above the maximum normal liquid level. [30:21.4.3.1.2]
66.21.4.3.2 *
Normal venting shall be provided for primary tanks and each primary compartment of a compartmented tank. [30:21.4.3.2]

66.21.4.3.3
Normal vents shall be sized in accordance with either API Standard 2000, Venting Atmospheric and Low-Pressure Storage Tanks, or another approved standard. Alternatively, the normal vent shall be at least as large as the largest filling or withdrawal connection, but in no case shall it be less than 1.25 in. (32 mm) nominal inside diameter. [30:21.4.3.3]

66.21.4.3.4 *
Atmospheric storage tanks shall be vented so as not to exceed the tank’s design operating pressure or a gauge pressure of 1.0 psi (6.9 kPa), whichever is less, and shall be vented to prevent the development of vacuum. [30:21.4.3.24]

A.66.21.4.3.4 A.66.21.4.3.2
Tanks intended for normal operation at pressures greater than a gauge pressure of 1.0 psi (6.9 kPa) are designed in accordance with 66.21.4.2.3. It is recognized that a slight vacuum is necessary to operate a vacuum vent. [30:A.21.4.3.24]

66.21.4.3.5
Low-pressure tanks and pressure vessels shall be vented to prevent the development of pressure or vacuum that exceeds the rated design pressure of the tank or vessel. Means shall also be provided to prevent overpressure from any pump discharging into the tank or vessel when the pump discharge pressure can exceed the design pressure of the tank or vessel. [30:21.4.3.35]

66.21.4.3.6
If any tank or pressure vessel has more than one fill or withdrawal connection and simultaneous filling or withdrawal can be made, the vent size shall be based on the maximum anticipated simultaneous flow. [30:21.4.3.46]

66.21.4.3.7
For tanks equipped with vents that permit pressures to exceed a gauge pressure of 2.5 psi (17 kPa) and for low-pressure tanks and high-pressure vessels, the outlet of all vents and vent drains shall be arranged to discharge in a manner that prevents localized overheating of or flame impingement on any part of the tank, if vapors from the vents are ignited. [30:21.4.3.57]

66.21.4.3.8
Tanks and pressure vessels that store Class IA liquids [FP < 73°F (22.8°C) and BP < 100°F (37.8°C)] shall be equipped with venting devices that are closed, except when venting under pressure or vacuum conditions. [30:21.4.3.68]
66.21.4.3.7 66.21.4.3.9
Tanks and pressure vessels that store Class IB and Class IC liquids \[FP < 100°F (37.8°C) \text{ and } BP ≥ 100°F (37.8°C)\] shall be equipped with venting devices or with listed flame arresters. When used, vent devices shall be closed, except when venting under pressure or vacuum conditions. [30:21.4.3.79]

66.21.4.3.8 66.21.4.3.10
Tanks of 3000 barrels (bbl) [126,000 gal or (475 m\(^3\))] capacity or less that store crude petroleum in crude-producing areas and outside aboveground atmospheric tanks of less than 1000 gal (3785 L) capacity that contain other than Class IA liquids \[FP < 73°F (22.8°C) \text{ and } BP < 100°F (37.8°C)\] shall be permitted to have open vents. [30:21.4.3.810]

66.21.4.3.9 66.21.4.3.11 *
Flame arresters or venting devices required in 66.21.4.3.8-6 and 66.21.4.3.79 shall be permitted to be omitted on tanks that store Class IB or Class IC liquids \[FP < 100°F (37.8°C) \text{ and } BP ≥ 100°F (37.8°C)\] where conditions are such that their use can, in case of obstruction, result in damage to the tank. [30:21.4.3.911]

A.66.21.4.3.11A 66.21.4.3.9
Liquid properties that justify omitting such devices include, but are not limited to, condensation, corrosiveness, crystallization, polymerization, freezing, or plugging. When any of these conditions exist, consideration should be given to heating, use of devices that employ special materials of construction, use of liquid seals, or inerting. See NFPA 69. [30:A.21.4.3.944]

66.21.4.3.10 66.21.4.3.12
Piping for normal vents shall be designed in accordance with Section 66.27. [30:21.4.3.102]

66.21.4.4 *Tank Fill Pipes.
Fill pipes that enter the top of a tank shall terminate within 6 in. (150 mm) of the bottom of the tank. Fill pipes shall be installed or arranged so that vibration is minimized.

Exception No. 1: Fill pipes in tanks whose vapor space under the expected range of operating conditions is not in the flammable range or is inerted need not meet this requirement.

Exception No. 2: Fill pipes in tanks handling ignitible (flammable or combustible) liquids with minimal potential for accumulation of static charge need not meet this requirement, provided that the fill line is designed and the system is operated to avoid mist generation and to provide residence time downstream of filters or screens to allow dissipation of the generated static charge. [30:21.4.4]

66.21.5.1.2
An approved listing mark on a tank shall be considered to be evidence of compliance with 66.21.5.1. Tanks not so marked shall be tested before they are placed in service in accordance with the applicable requirements for testing in the codes-standards listed in 66.21.4.2.1.1, 66.21.4.2.2.1, or 66.21.4.2.3.1 or in accordance with recognized engineering standards. Upon satisfactory completion of testing, a permanent record of the test results shall be maintained by the owner. [30:21.5.1.1]
66.21.5.2.2
Air pressure shall not be used to test tanks that contain flammable or combustible liquids or vapors. (See Section 27.7 of NFPA 30 for testing pressure piping.) [30:21.5.2.2]

66.21.5.2.3
For field-erected tanks, the tests required by 66.21.5.1.2 or 66.21.5.1.2 of NFPA 30 shall be permitted to be considered the test for tank tightness. [30:21.5.2.3]

66.21.6.3.2
Maintenance and operating procedures and practices at tank storage facilities shall be established and implemented to control leakage and prevent spillage and release of ignitible (flammable or combustible) liquids. [30:21.6.6.2]

66.21.6.3.3
Ground areas around tank storage facilities shall be kept free of weeds, trash, and other unnecessary combustible materials. [30:21.6.6.3]

66.21.7.2.1 Identification for Emergency Responders.
A sign or marking that meets the requirements of NFPA 704 or another approved system, shall be applied to storage tanks containing ignitible (flammable or combustible) liquids. The marking shall be located where it can be seen, such as on the side of the tank, the shoulder of an accessway or walkway to the tank or tanks, or on the piping outside of the diked area. If more than one tank is involved, the markings shall be so located that each tank can be identified. [30:21.7.2.1]

66.21.7.3.1 TankWater Loading.

66.21.7.3.1.1
The filling of a tank to be protected by water or product loading shall be started as soon as floodwaters are predicted to reach a dangerous flood stage. [30:21.7.3.1.1]

66.21.7.3.1.2
Where independently fueled water pumps are relied on, sufficient fuel shall be available at all times to permit continuing operations until all tanks are filled. [30:21.7.3.1.2]

66.21.7.3.1.3
Tank valves shall be locked in a closed position when water loading has been completed. [30:21.7.3.1.3]

66.21.7.4 Leak Detection and Inventory Records for Underground Storage Tanks.
Accurate inventory records or a leak detection program shall be maintained on all Class I liquid [FP < 100°F (37.8°C)] storage tanks for indication of leakage from the tanks or associated piping. [30:21.7.5]
66.22 Storage of Ignitible (Flammable or Combustible) Liquids in Tanks — Aboveground Storage Tanks.

66.22.1 Scope.
This section shall apply to the following:

1. The storage of flammable and combustible liquids, as defined in 3.3.178.1 and 3.3.178.2 and Section 66.4, in fixed tanks that exceed 60 gal (230 L) capacity
2. The storage of flammable and combustible liquids in portable tanks that exceed 660 gal (2500 L) capacity
3. The storage of flammable and combustible liquids in intermediate bulk containers that exceed 793 gal (3000 L)
4. The design, installation, testing, operation, and maintenance of such tanks, portable tanks, and bulk containers

66.22.2 Definitions Specific to Section 66.22.
For the purpose of this section, the terms in this section shall have the definitions given.

66.22.3 General Requirements.
Storage of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] heated at or above their flash point FP shall follow the requirements for Class I liquids [FP < 100°F (37.8°C)], unless an engineering evaluation conducted in accordance with Section 66.6 justifies following the requirements for some other liquid class.

66.22.4.1.1 Tanks storing Class I, Class II, or Class IIIA stable liquids [FP < 200°F (93°C)] whose internal pressure is not permitted to exceed a gauge pressure of 2.5 psi (17 kPa) shall be located in accordance with Table 66.22.4.1.1(a) and Table 66.22.4.1.1(b). Where tank spacing is based on a weak roof-to-shell seam design, the user shall present evidence certifying such construction to the AHJ upon request.

Table 66.22.4.1.1(a) Location of Aboveground Storage Tanks Storing Stable Liquids — Internal Pressure Not to Exceed a Gauge Pressure of 2.5 psi (17 kPa)

<table>
<thead>
<tr>
<th>Type of Tank</th>
<th>Protection</th>
<th>Minimum Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating roof</td>
<td>-Protection for exposures</td>
<td>-From Property Line That Is or Can Be Built Upon, Including the Opposite Side of a Public Way&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-None</td>
<td>-1/2 x diameter of tank</td>
</tr>
</tbody>
</table>

<sup>a</sup>Diameter of tank but need not exceed 175 ft
<sup>b</sup>Important Notice: This document is the copyright property of the National Fire Protection Association (NFPA), Copyright © 2020 NFPA, and may not be used for any other purpose or distributed to any other persons or parties.
<table>
<thead>
<tr>
<th>Vertical with weak roof-to-shell seam</th>
<th>-Approved foam or inerting system(^c) on tanks not exceeding 150 ft in diameter(^d)</th>
<th>(-\frac{1}{2}) × diameter of tank</th>
<th>(-\frac{1}{6}) × diameter of tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Protection for exposures(^b)</td>
<td>-Diameter of tank</td>
<td>(-\frac{1}{3}) × diameter of tank</td>
<td></td>
</tr>
<tr>
<td>Horizontal and vertical tanks with emergency relief venting to limit pressures to 2.5 psi (gauge pressure of 17 kPa)</td>
<td>-Approved inerting system(^c) on the tank or approved foam system on vertical tanks</td>
<td>(-\frac{1}{2}) × value in Table 66.22.4.1.1(b)</td>
<td>(-\frac{1}{2}) × value in Table 66.22.4.1.1(b)</td>
</tr>
<tr>
<td>-Protection for exposures(^b)</td>
<td>-Value in Table 66.22.4.1.1(b)</td>
<td>-Value in Table 66.22.4.1.1(b)</td>
<td></td>
</tr>
<tr>
<td>-None</td>
<td>(-2) × value in Table 66.22.4.1.1(b)</td>
<td>-Value in Table 66.22.4.1.1(b)</td>
<td></td>
</tr>
<tr>
<td>Protected aboveground tank</td>
<td>-None</td>
<td>(-\frac{1}{2}) × value in Table 66.22.4.1.1(b)</td>
<td>(-\frac{1}{2}) × value in Table 66.22.4.1.1(b)</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m.

\(^a\)The minimum distance cannot be less than 5 ft (1.5 m).

\(^b\)See definition 3.3.46 of NFPA 30, Protection for Exposures.

\(^c\)See NFPA 69.

\(^d\)For tanks over 150 ft (45 m) in diameter, use “Protection for Exposures” or “None,” as applicable. [\(30:\) Table 22.4.1.1(a)]

**Table 66.22.4.1.1(b) Reference Table for Use with Tables 66.22.4.1.1(a), 66.22.4.1.3, and 66.22.4.1.5**
### Table 66.22.4.1.1(a) Location of Aboveground Storage Tanks Storing Stable Liquids — Minimum Distance (ft)

<table>
<thead>
<tr>
<th>Tank Capacity (gal)</th>
<th>-From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way</th>
<th>-From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>275 or less</td>
<td>.5</td>
<td>.5</td>
</tr>
<tr>
<td>276 to 750</td>
<td>.10</td>
<td>.5</td>
</tr>
<tr>
<td>751 to 12,000</td>
<td>.15</td>
<td>.5</td>
</tr>
<tr>
<td>12,001 to 30,000</td>
<td>.20</td>
<td>.5</td>
</tr>
<tr>
<td>30,001 to 50,000</td>
<td>.30</td>
<td>.10</td>
</tr>
<tr>
<td>50,001 to 100,000</td>
<td>.50</td>
<td>.15</td>
</tr>
<tr>
<td>100,001 to 500,000</td>
<td>.80</td>
<td>.25</td>
</tr>
<tr>
<td>500,001 to 1,000,000</td>
<td>.100</td>
<td>.35</td>
</tr>
<tr>
<td>1,000,001 to 2,000,000</td>
<td>.135</td>
<td>.45</td>
</tr>
<tr>
<td>2,000,001 to 3,000,000</td>
<td>.165</td>
<td>.55</td>
</tr>
<tr>
<td>3,000,001 or more</td>
<td>.175</td>
<td>.60</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L. [30: Table 22.4.1.1(b)]

### 66.22.4.1.2

Vertical tanks with weak roof-to-shell seams (see 66.22.7.2 of NFPA 30) that store Class IIIA liquids [FP < 200°F (93°C)] shall be permitted to be located at one-half the distances specified in Table 66.22.4.1.1(a), provided the tanks are not within the same diked area as, or within the drainage path of, a tank storing a Class I or Class II liquid [FP < 140°F (60°C)]. [30:22.4.1.2]

### 66.22.4.1.3

Tanks storing Class I, Class II, or Class IIIA stable liquids [FP < 200°F (93°C)] and operating at pressures that exceed a gauge pressure of 2.5 psi (17 kPa), or are equipped with emergency venting that will permit pressures to exceed a gauge pressure of 2.5 psi (17 kPa), shall be located in accordance with Table 66.22.4.1.3 and Table 66.22.4.1.1(b). [30:22.4.1.3]
Tanks storing ignitable (flammable or combustible) liquids with boil-over characteristics shall be located in accordance with Table 66.22.4.1.4. Liquids with boil-over characteristics shall not be stored in fixed roof tanks larger than 150 ft (45 m) in diameter, unless an approved inerting system is provided on the tank. [30:22.4.1.4]

<table>
<thead>
<tr>
<th>Type of Tank</th>
<th>Protection</th>
<th>From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way&lt;sup&gt;a&lt;/sup&gt;</th>
<th>From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating roof</td>
<td>No protection&lt;sup&gt;b&lt;/sup&gt;</td>
<td>( \frac{1}{2} \times \text{diameter of tank} )</td>
<td>( \frac{1}{6} \times \text{diameter of tank} )</td>
</tr>
<tr>
<td>Fixed roof</td>
<td>No protection&lt;sup&gt;b&lt;/sup&gt;</td>
<td>( \text{diameter of tank} )</td>
<td>( \frac{1}{6} \times \text{diameter of tank} )</td>
</tr>
<tr>
<td>Fixed roof</td>
<td>Approved foam or inerting system&lt;sup&gt;c&lt;/sup&gt;</td>
<td>( \text{diameter of tank} )</td>
<td>( \frac{1}{3} \times \text{diameter of tank} )</td>
</tr>
<tr>
<td>Fixed roof</td>
<td>No protection&lt;sup&gt;b&lt;/sup&gt;</td>
<td>( 2 \times \text{diameter of tank} )</td>
<td>( \frac{2}{3} \times \text{diameter of tank} )</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m.

<sup>a</sup>The minimum distance cannot be less than 5 ft.

<sup>b</sup>See definition 3.3.46 of NFPA 30, Protection for Exposures.

<sup>c</sup>See NFPA 69. [30:22.4.1.4]

Tanks storing unstable liquids shall be located in accordance with Table 66.22.4.1.5 and Table 66.22.4.1.1(b). [30:22.4.1.5]

<table>
<thead>
<tr>
<th>Minimum Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( -4 \times \text{diameter of tank but need not exceed 350 ft} )</td>
</tr>
<tr>
<td>( \frac{2}{3} \times \text{diameter of tank} )</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m.
<table>
<thead>
<tr>
<th>Type of Tank</th>
<th>Protection</th>
<th>-From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way</th>
<th>-From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal and vertical tanks with emergency relief venting to permit pressure not in excess of a gauge pressure of 2.5 psi (17 kPa)</td>
<td>-Tank protected with any one of the following: approved water spray, approved inerting, approved insulation and refrigeration, approved barricade</td>
<td>-Value in Table 66.22.4.1.1(b) but not less than 25 ft</td>
<td>-Not less than 25 ft</td>
</tr>
<tr>
<td></td>
<td>-Protection for exposures&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-2&lt;sup&gt;1/2&lt;/sup&gt; × value in Table 66.22.4.1.1(b) but not less than 50 ft</td>
<td>-Not less than 50 ft</td>
</tr>
<tr>
<td></td>
<td>-None</td>
<td>-5 × value in Table 66.22.4.1.1(b) but not less than 100 ft</td>
<td>-Not less than 100 ft</td>
</tr>
<tr>
<td>Horizontal and vertical tanks with emergency relief venting to permit pressure over a gauge pressure of 2.5 psi (17 kPa)</td>
<td>-Tank protected with any one of the following: approved water spray, approved inerting, approved insulation and refrigeration, approved barricade</td>
<td>-2 × value in Table 66.22.4.1.1(b) but not less than 50 ft</td>
<td>-Not less than 50 ft</td>
</tr>
<tr>
<td></td>
<td>-Protection for exposures&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-4 × value in Table 66.22.4.1.1(b) but not less than 100 ft</td>
<td>-Not less than 100 ft</td>
</tr>
<tr>
<td></td>
<td>-None</td>
<td>8 × value in Table 66.22.4.1.1(b) but not less than 150 ft</td>
<td>-Not less than 150 ft</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m.

<sup>a</sup>See NFPA 69.

<sup>b</sup>See definition 3.3.46 of NFPA 30, Protection for Exposures. [30: Table 22.4.1.5]

66.22.4.1.6

Tanks storing Class IIIB stable liquids [FP ≥ 200°F (93°C)] shall be located in accordance with Table 66.22.4.1.6.

Table 66.22.4.1.6 Location of Aboveground Storage Tanks Storing Class IIIB Liquids [FP ≥ 200°F (93°C)]
<table>
<thead>
<tr>
<th>Tank Capacity (gal)</th>
<th>From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way</th>
<th>From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>12,000 or less</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>12,001 to 30,000</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>30,001 to 50,000</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>50,001 to 100,000</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>100,001 or more</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L. [30: Table 22.4.1.6]

*Exception: If located within the same diked area as, or within the drainage path of, a tank storing a Class I or Class II liquid [FP < 140°F (60°C)], the tank storing Class IIIB liquid [FP ≥ 200°F (93°C)] shall be located in accordance with 66.22.4.1.1. [30:22.4.1.6]

66.22.4.2.1 *

Tanks storing Class I, Class II, or Class IIIA stable liquids [FP < 200°F (93°C) and any BP] shall be separated by the distances given in Table 66.22.4.2.1. [30:22.4.2.1]

**Table 66.22.4.2.1 Minimum Shell-to-Shell Spacing of Aboveground Storage Tanks**

<table>
<thead>
<tr>
<th>Tank Diameter</th>
<th>Floating Roof Tanks</th>
<th>-Class I or II Liquids [FP &lt; 140°F (60°C)]</th>
<th>-Class IIIA Liquids [140°F (60°C) ≤ FP &lt; 200°F (93°C)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>All tanks not over 150 ft (45 m) in diameter</td>
<td>(\frac{1}{6} \times \text{sum of adjacent tank diameters but not less than 3 ft (0.9 m)})</td>
<td>(\frac{1}{6} \times \text{sum of adjacent tank diameters but not less than 3 ft (0.9 m)})</td>
<td>(\frac{1}{6} \times \text{sum of adjacent tank diameters but not less than 3 ft (0.9 m)})</td>
</tr>
<tr>
<td>Tanks larger than 150 ft (45 m) in diameter:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>—If remote impounding is provided in accordance with 66.22.11.1</td>
<td>(\frac{1}{6} \times \text{sum of adjacent tank diameters})</td>
<td>(\frac{1}{4} \times \text{sum of adjacent tank diameters})</td>
<td>(\frac{1}{6} \times \text{sum of adjacent tank diameters})</td>
</tr>
<tr>
<td>—If open diking is provided in accordance with 66.22.11.2</td>
<td>(\frac{1}{4} \times \text{sum of adjacent tank diameters})</td>
<td>(\frac{1}{3} \times \text{sum of adjacent tank diameters})</td>
<td>(\frac{1}{4} \times \text{sum of adjacent tank diameters})</td>
</tr>
</tbody>
</table>

Note: The “sum of adjacent tank diameters” means the sum of the diameters of each pair of tanks that are adjacent to each other. See also A.66.22.4.2.1. [30: Table 22.4.2.1]

**66.22.4.2.1.1**

Tanks that store crude petroleum, have individual capacities not exceeding 3000 bbl ([126,000 gal])
66.22.4.2.1.1
Tanks used only for storing Class IIIB liquids \([\text{FP} \geq 200^\circ\text{F} (93^\circ\text{C})]\) shall not be required to be separated by more than 3 ft (0.9 m). \[30:22.4.2.1.1\]

66.22.4.2.2
A tank storing unstable liquid shall be separated from any other tank containing either an unstable liquid or a Class I, Class II, or Class III liquid \(\text{(any FP or BP)}\) by a distance not less than one-half the sum of their diameters. \[30:22.4.2.2\]

66.22.4.2.3
Where tanks are in a diked area containing Class I or Class II liquids \([\text{FP} < 140^\circ\text{F} (60^\circ\text{C})]\) or in the drainage path of Class I or Class II liquids \([\text{FP} < 140^\circ\text{F} (60^\circ\text{C})]\) and are compacted in three or more rows or in an irregular pattern, greater spacing or other means shall be permitted to be required by the AHJ to make tanks in the interior of the pattern accessible for fire-fighting purposes. \[30:22.4.2.3\]

66.22.4.2.4
The minimum horizontal separation between an LP-Gas container and a Class I, Class II, or Class IIIA \([\text{FP} < 200^\circ\text{F} (93^\circ\text{C})]\) liquid storage tank shall be 20 ft (6 m). \[30:22.4.2.4\]

66.22.4.2.4.1
Means shall be provided to prevent Class I, Class II, or Class IIIA liquids \(\text{[FP} < 200^\circ\text{F} (93^\circ\text{C})]\) from accumulating under adjacent LP-Gas containers by means of dikes, diversion curbs, or grading. \[30:22.4.2.4.1\]

66.22.4.2.4.2
Where flammable or combustible liquid storage tanks are within a diked area, the LP-Gas containers shall be outside the diked area and at least 10 ft (3 m) away from the centerline of the wall of the diked area. \[30:22.4.2.4.2\]

66.22.4.2.5
If a tank storing a Class I, Class II, or Class IIIA liquid \(\text{[FP} < 200^\circ\text{F} (93^\circ\text{C})]\) liquid operates at pressures exceeding a gauge pressure of 2.5 psi (17 kPa) or is equipped with emergency relief venting that will permit pressures to exceed a gauge pressure of 2.5 psi (17 kPa), it shall be separated from an LP-Gas container by the appropriate distance given in Table 66.22.4.2.1. \[30:22.4.2.5\]

A.66.22.5.2.1
Appendix E of API Standard 650, \textit{Welded Steel Tanks for Oil Storage}, and Appendix B of API 620,
Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks, provide information on tank foundations. [30:A.22.5.2.1]

66.22.5.2.3
Where tanks storing Class I, Class II, or Class IIIA liquids \([\text{FP} < 200^\circ\text{F (93°C)}]\) are supported above their foundations, tank supports shall be of concrete, masonry, or protected steel.

*Exception: Single wood timber supports (not cribbing), laid horizontally, shall be permitted to be used for outside aboveground tanks if not more than 12 in. (300 mm) high at their lowest point.* [30:22.5.2.3]

66.22.5.2.4 *
Steel support structures or exposed piling for tanks storing Class I, Class II, or Class IIIA liquids \([\text{FP} < 200^\circ\text{F (93°C)}]\) shall be protected by materials having a fire resistance rating of not less than 2 hours.

*Exception No. 1: Steel saddles do not need to be protected if less than 12 in. (300 mm) high at their lowest point.*

*Exception No. 2: At the discretion of the AHJ, water spray protection in accordance with NFPA 15 or NFPA 13, is permitted to be used.* [30:22.5.2.4]

66.22.5.2.5
Where a tank is located in an area subject to flooding, provisions shall be taken to prevent tanks, either full or empty, from floating or sliding during a rise in water level up to the established maximum flood stage. *(See 66.21.7.3.)* [30:22.5.2.5]

66.22.7.1.1.3
Tanks storing Class IIIB liquids \([\text{FP} \geq 200^\circ\text{F (93°C)}]\) that are larger than 12,000 gal (45,400 L) capacity and are not within the diked area or the drainage path of tanks storing Class I or Class II liquids \([\text{FP} < 140^\circ\text{F (60°C)}]\) shall not be required to meet the requirements of 66.22.7.1. [30:22.7.1.1.3]

66.22.7.2.2
Emergency relief vent devices shall be vaportight and restricted to shall be permitted to be any one of the following:

1. Self-closing manway cover
2. Manway cover provided with long bolts that permit the cover to lift under internal pressure
3. Additional or larger relief valve or valves

[30:22.7.3.2.1]

66.22.8 *Fire Protection for Aboveground Storage Tanks Control.*
A fire-extinguishing system in accordance with an applicable NFPA standard shall be provided or made available for a storage tank where all of the following conditions apply:

1. The tank is a vertical atmospheric storage tank that has a capacity of 50,000 gal (190 m³) or more.
2. The tank contains a Class I liquid \([\text{FP} < 100^\circ\text{F (37.8°C)}]\).
The tank is located in a congested area where there is an unusual exposure hazard to the tank from adjacent property or to adjacent property from the tank.

The tank has a fixed-roof or a combination fixed- and floating-roof that does not meet the requirements of 66.22.2.2(2) or (3) to be classified as a floating roof tank.

### 66.22.8.1
A fire-extinguishing system in accordance with an applicable NFPA standard shall be provided or shall be available for vertical atmospheric fixed-roof storage tanks larger than 50,000 gal (190 m³) capacity, storing Class I liquids, if located in a congested area where there is an unusual exposure hazard to the tank from adjacent property or to adjacent property from the tank. [30:22.8.1]

A.66.22.8.1
Requirements in this section might also apply to Class II and Class III liquids [FP ≥ 100°F (37.8°C)] that are heated at or above their flashpoint. This was previously stated in subsection 66.22.8.2 in the 2018 edition and in prior editions, but was later deleted because Section 66.22.3 had been added to apply that requirement to the entirety of Chapter 22. [30:A.22.8]

Protection against fire or explosion required for large flammable liquid storage tanks should consider the use of fixed, semi-fixed, or portable protection system designed in conformance with good engineering practice such as those described in NFPA 11, NFPA 15, and NFPA 69. Ordinary combustibles (such as wood) would be subject to radiant heat unpiolated ignition from a burning tank, when such exposures are located a distance of less than about 150 percent of the tank diameter (assuming no wind effects). Exposure from adjacent property to the tanks would depend on the specific products and storage arrangement and may require some engineering analysis based on the occupancy and its exposure potential. [30:A.22.8.1]

### 66.22.8.2
Fixed-roof tanks storing Class II or Class III liquids at temperatures below their flash points and floating-roof tanks storing any liquid shall not require protection when installed in accordance with this section. [30:22.8.2]

### 66.22.11 *Control of Spills from Aboveground Storage Tanks.
Every tank that contains a Class I, Class II, or Class IIIA liquid [FP < 200°F (93°C)] shall be provided with means to prevent an accidental release of liquid from endangering important facilities and adjoining property or from reaching waterways. Such means shall meet the requirements of 66.22.11.1, 66.22.11.2, 66.22.11.3, or 66.22.11.4, whichever is applicable. [30:22.11]

#### 66.22.11.1 Remote Impounding.
Where control of spills is provided by drainage to a remote impounding area so that spilled ignitable (flammable or combustible) liquid does not collect around tanks, the requirements of 66.22.11.1.1 through 66.22.11.1.4 shall apply. [30:22.11.1]

#### 66.22.11.2 Impounding Around Tanks by Open Diking.
Where control of spills is provided by means of impounding by open diking around the tanks, such systems shall meet the requirements of 22.11.2.1 through 22.11.2.8 of NFPA 30. [30:22.11.2]

66.22.11.2.1
Where provision is made for draining water from diked areas, such drains shall be controlled to prevent ignitible (flammable or combustible) liquids from entering natural water courses, public sewers, or public drains. [30:22.11.2.7]

66.22.12.2.1
Drainage shall be provided to prevent accumulation of any ignitible (flammable or combustible) liquid under the piping by providing a slope of not less than 1 percent away from the piping for at least 50 ft (15 m). [30:22.12.2.1]

66.22.13.3
Openings for gauging on tanks storing Class I liquids [FP < 100°F (37.8°C)] shall be provided with a vaportight cap or cover. [30:22.13.3]

66.22.13.4
Filling and emptying connections for Class I, Class II, and Class IIIA liquids [FP < 200°F (93°C)] that are connected and disconnected shall be located outside of buildings at a location free from any source of ignition. [30:22.13.4]

66.22.13.4.2
Such connections for any ignitible (flammable or combustible) liquid shall be closed and liquidtight when not in use and shall be properly identified. [30:22.13.4.2]

66.23 Storage of Ignitible (Flammable or Combustible) Liquids in Tanks — Underground Tanks.

66.24.3.1.1 *
Listed portable fire extinguishers shall be provided for facilities in such quantities, sizes, and types as could be needed for special storage hazards as determined in accordance with 66.21.6.1.2 of NFPA 30. [30:24.6.1.1]

66.24.3.1.2 *
Where the need is indicated in accordance with 66.21.6.3 of NFPA 30, water shall be utilized through standpipe and hose systems, or through hose connections from sprinkler systems using combination spray and straight stream nozzles to permit effective fire control. [30:24.6.1.2]

66.24.3.1.3
Where the need is indicated in accordance with 66.21.6.3 of NFPA 30, mobile foam apparatus shall be provided. [30:24.6.1.3]
66.24.3.2.3 *
Where the need is indicated by the hazards of storage or exposure as determined by 66.21.6.3 of NFPA 30, fixed protection shall be required utilizing approved foam, foam-water sprinkler systems, sprinkler systems, water spray systems, deluge systems, gaseous extinguishing systems, dry chemical extinguishing systems, fire-resistive materials, or a combination of these. [30:24.6.2.3]

A.66.24.3.2.3
See NFPA 13, NFPA 15, and NFPA 16 for information on these subjects. [30:A.24.6.2.3]

For certain fuel types, such as ketones, esters, and alcohols, the minimum required densities established in the listing criteria for foam discharge devices are often higher than the general densities specified for protection of flammable and combustible (ignitable) liquids. When determining the design criteria for extinguishing systems using foam, it is important to ensure that the listing criteria, which are typically based on empirical data from fire tests, are not overlooked. Otherwise, the fire protection system design can be inadequate for proper protection. [30:A.24.6.2.3]

66.24.3.2.3.1
When foam or foam-water fire protection systems are provided, discharge densities shall be determined based on the listing criteria for selected foam discharge devices, the foam concentrate, and the specific flammable or combustible liquids to be protected. [30:24.6.2.3.1]

66.24.3.2.4
If provided, fire control systems shall be designed, installed, and maintained in accordance with the following NFPA standards:

1. NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam
2. NFPA 12, Standard on Carbon Dioxide Extinguishing Systems
3. NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems
4. NFPA 13, Standard for the Installation of Sprinkler Systems
7. NFPA 17, Standard for Dry Chemical Extinguishing Systems
8. NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

[30:24.6.2.4]

66.24.5.2
The facility shall be designed and operated to prevent the discharge of flammable or combustible liquids to public waterways, public sewers, or adjoining property under normal operating conditions. [30:24.9.2]

66.24.5.4
Openings to adjacent rooms or buildings shall be provided with noncombustible, liquidtight raised sills.
or ramps at least 4 in. (100 mm) in height or shall be otherwise designed to prevent the flow of ignitable (flammable or combustible) liquids to the adjoining areas. [30:24.9.4]

66.24.5.5
Means shall be provided to prevent ignitable (flammable or combustible) liquid spills from running into basements. [30:24.9.5]

66.24.5.7
Emergency drainage systems shall be provided to direct flammable or combustible liquid leakage and fire-protection water to a safe location. [30:24.9.7]

66.24.9.5.1
Emergency relief vents on protected aboveground tanks complying with UL 2085 containing Class II and Class III liquids [FP ≥ 100°F (37.8°C)] shall be allowed to discharge inside the building. [30:24.13.5.1]

66.24.11.2
Those areas, including buildings, where the potential exists for a Class I flammable liquid [FP < 100°F (37.8°C)] spill shall be monitored as appropriate. Such methods shall include both of the following:

(1) Personnel observation or patrol

(2) Monitoring equipment that indicates a spill or leak has occurred in an unattended area [30:24.15.2]

A.66.25.3.1
Inspections are recommended for shop-fabricated aboveground tanks. One guide is SP001, Standard for Inspection of Aboveground Storage Tanks, which is published by the Steel Tank Institute. In addition, the tank owner might desire to conduct additional inspections to ensure the ongoing integrity of tanks and equipment. Because the interior of a vault will ordinarily remain dry and temperature-moderated, environmental effects on tanks and equipment inside vaults will be reduced as compared to aboveground tanks that are not protected from weather exposure. Accordingly, inspection and maintenance frequencies for exterior surfaces of tanks and piping in vaults are typically less critical than for aboveground tanks installed outdoors. Nevertheless, inspection and maintenance of emergency vents and overfill prevention devices are still necessary. [30:A.25.3.1]

Clearance between the shell of a tank or equipment in a vault and the interior vault wall should be sufficient to accommodate visual inspections and maintenance that might be needed. In addition, consideration should be given to the need for inspection and maintenance of tank interior surfaces that may be impacted by internal corrosion. [30:A.25.3.1]

Clearance should be adequate to permit the following:

(1) Entry into the vault interior by an inspector or maintenance worker

(2) Access to manipulate, repair, or replace any equipment or fittings in the vault
(3) Access within the vault to visually inspect, either by direct sight or with the aid of an optical vision extension tools, interior vault surfaces and exterior surfaces of tanks and equipment, to determine the source of any leakage that may occur, and to conduct any needed repairs [30:A.25.3.1]

Because vaults are designed to provide for entry by inspectors or maintenance workers, consideration should also be given to providing access for rescue by emergency responders who might be called upon to rescue an individual from a vault. Such consideration may include providing a minimum access hatch dimension of 36 in. (915 mm) and a minimum dimension for walkways in vault interior spaces of 30 in. (760 mm) to permit an emergency responder with an SCBA to maneuver and providing, in some cases, a second means of access to the vault interior. [30:A.25.3.1]

66.27.1.1
This section shall apply to the design, installation, testing, operation, and maintenance of piping systems for flammable and combustible liquids or flammable vapors. Such piping systems shall include but not be limited to pipe, tubing, flanges, bolting, gaskets, valves, fittings, flexible connectors, the pressure-containing parts of other components including but not limited to expansion joints and strainers, and devices that serve such purposes as mixing, separating, snubbing, distributing, metering, control of flow, or secondary containment. [30:27.1.1]

66.27.1.2
This section shall not apply to any of the following:
   (1) Tubing or casing on any oil or gas wells and any piping connected directly thereto
   (2) Motor vehicles, aircraft, boats, or piping that are integral to a stationary engine assembly
   (3) Piping within the scope of any applicable boiler and pressure vessel code [30:27.1.2]

66.27.2.3 Leak.
An unintended release of ignitable (flammable or combustible) liquid or vapor from the piping system due to failure of the piping system. [30:27.2.3]

66.27.3.1.1
The design, fabrication, assembly, test, and inspection of piping systems shall be suitable for the working pressures and structural stresses to be encountered by the piping system. [30:27.3.1.1]

66.27.3.1.2
Compliance with ASME B31.1, Power Piping; ASME B31.3, Process Piping; or ASME B31.4, Pipeline Transportation Systems for Liquids and Slurries; applicable sections of ASME B31, Code for Pressure Piping, and the provisions of this section shall be considered prima facie evidence of compliance with the foregoing provisions. [30:27.3.1.2]

66.27.4.1 Materials Specifications.
Pipe, valves, faucets, couplings, flexible connectors, fittings, and other pressure-containing parts shall
meet the material specifications and pressure and temperature limitations of ASME B31.3, *Code for
Liquids and Slurries*, except as provided for in 66.27.4.2, 66.27.4.3, and 66.27.4.4. [30:27.4.1]

**66.27.4.2 Ductile Iron.**

Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*. [30:27.4.2]

**66.27.4.3 Materials of Construction for Valves.**

Valves at storage tanks, as required by 22.14 of NFPA 30 and 66.22.13 and 66.24.10, and their
connections to the tank shall be of steel or ductile iron, except as provided for in 66.27.4.3.1,
66.27.4.3.2, or 66.27.4.4. [30:27.4.3]

**A.66.27.4.3.2**

For further information, see ASTM E119, *Standard Test Methods for Fire Tests of Building Construction
Tests of Protection Materials for Structural Steel*. [30:A.27.4.3.2]

**66.27.4.3.3**

Cast iron, brass, copper, aluminum, malleable iron, and similar materials shall be permitted to be used
on tanks described in 66.22.4.2.1.1 or on tanks storing Class IIIB liquids [flash point > 200°F (93°C)]
where the tanks are located outdoors and not within a diked area or drainage path of a tank storing a
Class I, Class II, or Class IIIA liquid [FP < 200°F (93°C)]. [30:27.4.3.3]

**66.27.4.4.1**

Low melting point materials, as defined in 66.27.2.4, shall be compatible with the ignitable (flammable or
combustible) liquids being handled and shall be used within the pressure and temperature limitations of
Transportation Systems for Liquids and Slurries*. [30:27.4.4.1]

**66.27.4.4**

Low melting point materials shall be permitted to be used outdoors aboveground, outside a dike,
outside a remote impounding area, or inside buildings, provided they meet one of the following
conditions:

1. They are resistant to damage by fire.
2. They are located so that any leakage resulting from failure will not expose persons, important
   buildings, tanks, or structures.
3. They are located where leakage can be controlled by operation of one or more accessible,
   remotely located valves.
4. They are included in valves or piping components connected to an aboveground secondary
   containment tank and located above the tank and within ten feet of a thermally activated fire
   valve that is upstream of the low melting point materials.
A thermally activated fire valve is a valve that meets UL 842, *Valves for Flammable Fluids; FM 7400, Liquid and Gas Safety Shutoff Valves; or API 607, Fire Tests for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats.* [30:A.27.4.4.4(4)]

**A.66.27.4.4.5**

Low melting point materials shall be permitted to be used within a dike or within a remote impounding area, provided they meet one of the following:

1. They are connected above the normal operating liquid level of the tank.
2. They are connected below the normal operating liquid level of the tank and one of the following conditions is met:
   a. The stored liquid is a Class IIIB liquid \([\text{FP} \geq 200^\circ F (93^\circ C)]\), the tank is located outdoors, and the piping is not exposed to a potential spill or leak of a Class I, Class II, or Class IIIA liquid \([\text{FP} < 200^\circ F (93^\circ C)]\).
   b. The low melting point material is protected from fire exposure, such as by using materials that have a fire resistance rating of not less than 2 hours.

**A.66.27.5.1.2**

It is expected that some joints might leak under fire conditions but will not come apart.

**A.66.27.5.1.4**

Joints in piping systems handling Class I liquids \([\text{FP} < 100^\circ F (37.8^\circ C)]\) shall be welded when located in concealed spaces within buildings.

**66.27.5.2 Flexible Connectors.**

 Flexible connectors shall be listed and labeled in accordance with UL 2039, *Flexible Connector Pipe for Fuels,* and shall be installed in accordance with 66.27.5.3.

**66.27.7.1.1**

Where the outlets of vent pipes for tanks storing Class I liquids \([\text{FP} < 100^\circ F (37.8^\circ C)]\) are adjacent to buildings or public ways, they shall be located so that vapors are released at a safe point outside of buildings and not less than 12 ft (3.6 m) above the adjacent ground level.

**66.27.7.1.5**

Vent piping for tanks storing Class I liquids \([\text{FP} < 100^\circ F (37.8^\circ C)]\) shall not be manifolded with vent piping for tanks storing Class II or Class III liquids \([\text{FP} > 100^\circ F (37.8^\circ C)]\) unless positive means are provided to prevent the following:

1. Vapors of Class I liquids \([\text{FP} < 100^\circ F (37.8^\circ C)]\) from entering tanks storing Class II or Class III liquids \([\text{FP} > 100^\circ F (37.8^\circ C)]\)
Contamination

(3) Possible change in classification of the less volatile liquid

[30:27.8.1.5]

**66.27.7.1.6** *Extension of Emergency Vent Piping.*

Piping to or from approved emergency vents for atmospheric and low-pressure tanks shall be sized to provide emergency vent flows that limit the back pressure to less than the maximum pressure permitted by the design of the tank. Piping to or from approved emergency vents for pressure vessels shall be sized in accordance with the ASME *Boiler and Pressure Vessel Code.* Calculations demonstrating compliance with this paragraph shall include the start-to-open pressure of an approved emergency vent device, where provided. [30:27.8.1.6]

A.66.27.7.1.6

Vent sizing formulae and prescriptive vent sizes, such as those established by UL 142, *Steel Aboveground Tanks for Flammable and Combustible Liquids,* are typically based on the direct installation of a venting device onto a tank. When the outlet of a vent must be extended to a remote location, such as for tanks located in buildings, which require vent discharges, to be located outside, a significant reduction in vent flow can occur unless the size of the vent and connecting piping is increased. In such cases, the size of vents and vent pipe extensions should be calculated to ensure that a tank will not be over-pressurized during a fire exposure. [30:A.27.8.1.6]

**66.27.7.2.1** *

Vent pipes from underground tanks storing Class I liquids [FP < 100°F (37.8°C)] shall be located so that the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 ft (3.6 m) above the adjacent ground level. [30:27.8.2.1]

**66.27.7.2.5**

Vent piping shall be sized in accordance with Table 66.23.6.2 of NFPA 30. [30:27.8.2.5]

**66.27.7.2.6**

Vent pipes from tanks storing Class II or Class IIIA liquids [100°F (37.8°C) ≤ FP < 200°F (93°C)] shall terminate outside of the building and higher than the fill pipe opening. [30:27.8.2.6]

**66.27.7.2.13**

Vent piping for tanks storing Class I liquids [FP < 100°F (37.8°C)] shall not be manifolded with vent piping for tanks storing Class II or Class III liquids [FP ≥ 100°F (37.8°C)] unless positive means are provided to prevent the following:

1. Vapors of Class I liquids [FP < 100°F (37.8°C)] from entering tanks storing Class II or Class III liquids [FP > 100°F (37.8°C)]
2. Contamination
3. Possible change in classification of the less volatile liquid

[30:27.8.2.13]
A.66.27.9
Where loading and unloading risers for Class II or Class IIIA liquids [100°F (37.8°C) ≤ FP < 200°F (93°C)] are located in the same immediate area as loading and unloading risers for Class I liquids [FP < 100°F (37.8°C)], consideration should be given to providing positive means, such as different pipe sizes, connection devices, special locks, or other methods designed to prevent the erroneous transfer of Class I liquids [FP < 100°F (37.8°C)] into or from any container or tank used for Class II or Class IIIA liquids [100°F (37.8°C) ≤ FP < 200°F (93°C)]. Note that such consideration might not be necessary for water-miscible liquids, where the class is determined by the concentration of liquid in water, or where the equipment is cleaned between transfers. [30A.27.10]

66.27.10.2
The interior of the flexible connectors shall be compatible with the ignitible (flammable or combustible) liquid handled. [30:27.11.2]

66.27.10.3*
The exterior of the flexible connectors shall be resistant to or shielded from salt water and fresh water, ultraviolet radiation, physical damage, and damage by fire. [30:27.11.3]

A.66.27.10.3
A special marina use rating for aboveground piping systems is addressed in UL 1369, Above Ground Piping for Flammable and Combustible Liquids. [30A.27.11.3]

66.27.10.4
The flexible connectors shall be suitable for the intended pressures and shall be tested in accordance with 66.27.7 of NFPA 30. [30:27.11.4]

66.28.3.1.1
Bonding for the control of static electricity shall not be required where the following conditions exist:

1. Where tank cars and tank vehicles are loaded exclusively with products that do not have static-accumulating properties, such as asphalts (including cutback asphalts), most crude oils, residual oils, and water-soluble ignitible (flammable or combustible) liquids

2. Where no Class I liquids [FP < 100°F (37.8°C)] are handled at the loading facility and where the tank cars and tank vehicles loaded are used exclusively for Class II and Class III liquids [FP ≥ 100°F (37.8°C)] at temperatures below their flash points

3. Where tank cars and tank vehicles are loaded or unloaded through closed connections [30:28.3.1.1]

66.28.3.1.2 *
Loading and unloading facilities that are used to load ignitible (flammable or combustible) liquids into tank vehicles through open domes shall be provided with a means for electrically bonding to protect against static electricity hazards. [30:28.3.1.2]

66.28.3.1.3
Loading and unloading facilities that are used to transfer ignitable (flammable or combustible) liquids into and from tank cars through open domes shall be protected against stray currents by permanently bonding the fill pipe to at least one rail and to the facility structure, if of metal. [30:28.3.1.3]

66.28.3.1.3.2
In areas where excessive stray currents are known to exist, all pipelines entering the area shall be provided with insulating sections to electrically isolate them from the facility piping.

Exception: These precautions need not be required where only Class II or Class III liquids [FP ≥ 100°F (37.8°C)], at temperatures below their flash points, are handled and where there is no probability that tank cars will contain vapors from previous cargoes of Class I liquids [FP < 100°F (37.8°C)]. [30:28.3.1.3.2]

66.28.4.1
Tank vehicle and tank car loading and unloading facilities shall be separated from aboveground tanks, warehouses, other plant buildings, or the nearest line of adjoining property that can be built upon by a distance of at least 25 ft (7.6 m) for Class I liquids [FP < 100°F (37.8°C)] and for Class II and Class III liquids [FP ≥ 100°F (37.8°C)] handled at temperatures at or above their flash points and at least 15 ft (4.6 m) for Class II and Class III liquids [FP ≥ 100°F (37.8°C)] handled at temperatures below their flash points, measured from the nearest fill spout or transfer connection. [30:28.4.1]

66.28.10.1
Equipment such as piping, pumps, and meters used for the transfer of Class I liquids [FP < 100°F (37.8°C)] between storage tanks and the fill stem of the loading facility shall not be used for the transfer of Class II or Class III liquids [FP ≥ 100°F (37.8°C)] unless one of the following conditions exists:

1. Only water-miscible ignitable (flammable or combustible) liquid mixtures are handled, and the class of the mixture is determined by the concentration of liquid in water.
2. The equipment is cleaned between transfers.

[30:28.10.1]

66.28.11.1.1
Ignitable (flammable or combustible) liquids shall be loaded only into cargo tanks whose material of construction is compatible with the chemical characteristics of the liquid. The liquid being loaded shall also be chemically compatible with the liquid hauled on the previous load unless the cargo tank has been cleaned. [30:28.11.1.1]

66.28.11.1.3
When transferring Class I liquids [FP < 100°F (37.8°C)], or Class II or Class III liquids [FP ≥ 100°F (37.8°C)] liquids at temperatures at or above their flash points, engines of tank vehicles or motors of auxiliary or portable pumps shall be shut down during the making and breaking of hose connections. [30:28.11.1.3]

66.28.11.1.4
If loading or unloading is done without requiring the use of the motor of the tank vehicle, the motor
shall be shut down throughout any transfer operations involving Class I liquids \([\text{FP} < 100^\circ\text{F} (37.8^\circ\text{C})]\). [30:28.11.1.4]

66.28.11.6
When top loading a tank vehicle with Class I or Class II liquids \([\text{FP} < 140^\circ\text{F} (60^\circ\text{C})]\) without a vapor control system, valves used for the final control of flow shall be of the self-closing type and shall be manually held open except where automatic means are provided for shutting off the flow when the vehicle is full. [30:28.11.6]

66.28.11.7
When bottom loading a tank vehicle, a positive means shall be provided for loading a predetermined quantity of ignitible (flammable or combustible) liquids, together with a secondary automatic shutoff control to prevent overfill. [30:28.11.7]

66.28.11.11
Hose materials used for transfer shall be compatible with the ignitible (flammable or combustible) liquids being handled. [30:28.11.11]

66.28.11.2.1
Ignitible (flammable or combustible) liquids shall be loaded only into tank cars whose material of construction is compatible with the chemical characteristics of the liquid. The liquid being loaded shall also be chemically compatible with the liquid hauled on the previous load unless the tank car has been cleaned. [30:28.11.2.1]

66.28.11.2.2 *
Filling through open domes into tank cars that contain vapor–air mixtures within the flammable range, or where the ignitible (flammable or combustible) liquid being filled can form such a mixture, shall be by means of a downsput that extends to within 6 in. (150 mm) of the bottom of the tank unless the liquid is not an accumulator of static electric charges. [30:28.11.2.2]

66.28.11.2.5
Hose materials used for transfer shall be compatible with the ignitible (flammable or combustible) liquids being handled. [30:28.11.2.5]

66.28.11.3 *Switch Loading.
To prevent hazards due to a change in \(\text{FP flash point}\), of liquids, any tank car or tank vehicle that has previously contained a Class I liquid \([\text{FP} < 100^\circ\text{F} (37.8^\circ\text{C})]\) shall not be loaded with a Class II or Class III liquid \([\text{FP} > 100^\circ\text{F} (37.8^\circ\text{C})]\) unless proper precautions are taken. [30:28.11.3]

A.66.28.11.3
The term \textit{switch loading} describes a situation that warrants special consideration. [30:A.28.11.3]

When a tank is emptied of a cargo of Class I liquid \([\text{FP} < 100^\circ\text{F} (37.8^\circ\text{C})]\), a mixture of vapor and air is left,
which can be, and often is, within the flammable range. When such a tank is refilled with a Class I liquid [FP < 100°F (37.8°C)], any charge that reaches the tank shell will be bled off by the required bond wire. Also, there will be no flammable mixture at the surface of the rising oil level because the Class I liquid [FP < 100°F (37.8°C)] produces at its surface a mixture too rich to be ignitable. This is the situation commonly existing in tank vehicles in gasoline service. If, as occasionally happens, a static charge does accumulate on the surface sufficient to produce a spark, it occurs in a too-rich, nonignitable atmosphere and thus causes no harm. [30:A.28.11.3]

A very different situation arises if the liquid is “switch loaded,” that is, when a Class II or Class III liquid [FP ≥ 100°F (37.8°C)] is loaded into a tank vehicle that previously contained a Class I liquid [FP < 100°F (37.8°C)]. [30:A.28.11.3]

Class II or Class III liquids [FP ≥ 100°F (37.8°C)] are not necessarily more potent static generators than the Class I liquid [FP < 100°F (37.8°C)] previously loaded, but the atmosphere in contact with the rising oil surface is not enriched to bring it out of the flammable range. If circumstances are such that a spark should occur either across the oil surface or from the oil surface to some other object, the spark occurs in a mixture that can be within the flammable range, and an explosion can result. [30:A.28.11.3]

It is emphasized that bonding the tank to the fill stem is not sufficient; a majority of the recorded explosions have occurred when it was believed the tank had been adequately bonded. The electrostatic potential that is responsible for the spark exists inside the tank on the surface of the liquid and cannot be removed by bonding. Measures to reduce the chance of such internal static ignition can be one or more of the following:

1. Avoid spark promoters. Conductive objects floating on the oil surface increase the charge of sparking to the tank wall. Metal gauge rods or other objects projecting into the vapor space can create a spark gap as the rising liquid level approaches the projection. A common precaution is to require that fill pipes (downspouts) reach as close to the bottom of the tank as practicable. Any operation such as sampling, taking oil temperature, or gauging that involves lowering a conductive object through an opening into the vapor space on the oil should be deferred until at least 1 minute after flow has ceased. This will permit any surface charge to relax.

2. Reduce the static generation by one or more of the following:
   a. Avoid splash filling and upward spraying of oil where bottom filling is used.
   b. Employ reduced fill rates at the start of filling through downspouts, until the end of the spout is submerged. Some consider 3 ft/sec (0.9 m/sec) to be a suitable precaution.
   c. Where filters are employed, provide relaxation time in the piping downstream from the filters. A relation time of 30 seconds is considered by some to be a suitable precaution.

3. Eliminate the flammable mixture before switch loadings by gas freeing or inerting.

[30:A.28.11.3]

See NFPA 77 and NFPA 385 for further information. [30:A.28.11.3]

66.29.1.1

This section shall apply to all wharves, as defined in 3.3.302, whose primary purpose is the bulk transfer
66.29.3.1
General-purpose wharves that handle bulk transfer of ignitible (flammable or combustible) liquids and other commodities shall meet the requirements of Section 28.2 and NFPA 307. [30:29.3.1]

66.29.3.2
Incidental handling of packaged cargo of ignitible (flammable or combustible) liquids and loading or unloading of general cargo, such as ships' stores, during transfer of liquids shall be conducted only when approved by the wharf supervisor and the senior officer of the vessel. [30:29.3.2]

66.29.3.3
Wharves at which ignitible (flammable or combustible) liquid cargoes are to be transferred in bulk to or from tank vessels shall be at least 100 ft (30 m) from any bridge over a navigable waterway or from any entrance to or superstructure of a vehicular or railroad tunnel under a waterway. [30:29.3.3]

66.29.3.8
Tanks used exclusively for ballast water or Class II or Class III liquids \([FP \geq 100°F (37.8°C)]\) stored at temperatures below their flash points shall be permitted to be installed on a wharf designed to support the weight of the tanks and its contents. [30:29.3.8]

66.29.3.10.3
The hose materials used for transfer shall be compatible with the ignitible (flammable or combustible) liquids being handled. [30:29.3.10.3]

66.29.3.11
Piping, valves, and fittings shall meet applicable requirements of Section 66.27 and shall also meet the following requirements:

1. Flexibility of piping shall be assured by layout and arrangement of piping supports so that motion of the wharf structure resulting from wave action, currents, tides, or the mooring of vessels will not subject the piping to excessive strain.
2. Pipe joints that depend on the friction characteristics of combustible materials or on the grooving of pipe ends for mechanical continuity of piping shall not be permitted.
3. Swivel joints shall be permitted to be used in piping to which hose are connected and for articulated swivel-joint transfer systems, provided the design is such that the mechanical strength of the joint will not be impaired if the packing materials should fail, for example, by exposure to fire.
4. Each line conveying Class I or Class II liquids \([FP < 140°F (60°C)]\) leading to a wharf shall be provided with a readily accessible block valve located on shore near the approach to the wharf and outside of any diked area. Where more than one line is involved, the valves shall be identified as to their specific lines and grouped in one location.
5. Means shall be provided for easy access to any cargo line valves that are located below the wharf deck.
Pipelines on wharves that handle Class I or Class II liquids [FP < 140°F (60°C)], or Class III liquids [FP ≥ 140°F (60°C)] at temperatures at or above their flash points FP, shall be bonded and grounded.

For marine terminals handling flammable liquids and combustible Class I liquids [FP < 100°F (37.8°C)] and Class II and Class III liquids [FP ≥ 100°F (37.8°C)] at temperatures at or above their flash points FP, Figure 66.29.3.22 shall be used to determine the extent of classified areas for the purpose of installation of electrical equipment.

Figure 66.29.3.22 Area Classification for a Marine Terminal Handling Flammable Class I Liquids [FP < 100°F (37.8°C)].

Spill collection shall be provided around manifold areas to prevent spread of ignitible (flammable or combustible) liquids to other areas of the wharf or under the wharf.

Because of the many variables involved, exact requirements cannot be provided. However, Table A.66.29.3.28 provides guidance on the level of fire protection typically provided at wharves and marine terminals handling Class I flammable liquids [FP < 100°F (37.8°C)].

Table A.66.29.3.28 Typical Fire Protection for Wharves and Marine Terminals

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>Not required.</td>
</tr>
<tr>
<td>a</td>
<td>A minimum of two 1/2 in. (38 mm) hydrant outlets should be provided at each monitor riser.</td>
</tr>
<tr>
<td>b</td>
<td>This can be provided by onshore mobile equipment.</td>
</tr>
<tr>
<td>c</td>
<td>One hose reel at each berth should have foam capability.</td>
</tr>
<tr>
<td>d</td>
<td>The proximity of adjacent berths may reduce the total required.</td>
</tr>
<tr>
<td>e</td>
<td>Under-dock systems are optional. Add water for under-dock system (0.16 × area).</td>
</tr>
<tr>
<td>f</td>
<td>Under-dock systems are optional. Add foam for under-dock system (0.16 × 0.3 × 30 × area).</td>
</tr>
</tbody>
</table>

For SI units, 1 gpm = 3.8 L/min; 1 gal = 3.8 L; 1 lb = 0.45 kg.

A minimum of two 11/2 in. (38 mm) hydrant outlets should be provided at each monitor riser. This can be provided by onshore mobile equipment. One hose reel at each berth should have foam capability. The proximity of adjacent berths may reduce the total required. Under-dock systems are optional. Add water for under-dock system (0.16 × area). Under-dock systems are optional. Add foam for under-dock system (0.16 × 0.3 × 30 × area).
66.29.3.28.4
Where no fire water main is provided, a minimum of two wheeled at least two 150 lb (68 kg) dry chemical extinguishers with minimum ratings of 240-B:C each shall be provided. The extinguishers shall be located within 50 ft (15 m) of pump or manifold areas and shall be easily reached along emergency access paths. Existing 150 lb (68 kg) dry chemical extinguishers that continue to be maintained in accordance with NFPA 10 shall be permitted to remain in service. [30:29.3.28.4]

F.1.2.8 ASTM Publications.

F.1.2.15 FM Publications.

F.3 References for Extracts in Informational Sections.
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1499 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

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<th>Emergency Nature:</th>
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<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>21 Agree (w/comment: Hanselka, Peterkin)</td>
<td>21 Agree (w/comment, Clary, Hanselka, Peterkin)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[30 \text{ eligible} \div 2 = 15 + 1 = (16)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 16.

(30 eligible to vote - 9 not returned - 0 abstentions = 21 \times 0.75 = 15.75)

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is June 23, 2020.
**NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE**
**PROPOSED TIA NO. 1499 BALLOT - FINAL RESULTS**

**QUESTION NO. 1:** I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1499 on various 30 Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Agree</td>
<td>21</td>
<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
<tr>
<td>James S. Peterkin</td>
<td></td>
<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
<td>Peter J. Willse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shane M. Clary</td>
<td>Agree</td>
<td></td>
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<td>Catherine L. Stashak</td>
<td>Agree</td>
<td></td>
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<tr>
<td>Anthony C. Apfelbeck</td>
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<td></td>
</tr>
<tr>
<td>Richard Jay Roberts</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Carl F. Baldassarara</td>
<td>I agree that the extract should be updated.</td>
<td></td>
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<tr>
<td>Kenneth E. Bush</td>
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<td></td>
</tr>
<tr>
<td>Scott M. Bryant</td>
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<td></td>
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<tr>
<td>Sarina L. Hart</td>
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<tr>
<td>John A. Sharry</td>
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<tr>
<td>Robert J. Davidson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
<td>Updates to NFPA30A are appropriate</td>
<td></td>
</tr>
<tr>
<td>Wade Palazini</td>
<td>Agree</td>
<td></td>
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<tr>
<td>Scott T. Laramee</td>
<td>I agree with the technical merits of this proposed TIA item.</td>
<td></td>
</tr>
<tr>
<td>Terin Hopkins</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Raymond C. O'Brocki</td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
<td></td>
</tr>
<tr>
<td>Kenneth Earl Tyree, Jr.</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Cesar Lujan</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Brian L. Olsen</td>
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<td></td>
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<tr>
<td>Disagree</td>
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**QUESTION NO. 2:** I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

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<td>James S. Peterkin</td>
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<td>A, B, C and D</td>
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<tr>
<td>Richard Jay Roberts</td>
<td>B</td>
</tr>
<tr>
<td>Carl F. Baldassarra</td>
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<td>Kenneth E. Bush</td>
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<td>Scott M. Bryant</td>
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<td>Sarina L. Hart</td>
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<td>John A. Sharry</td>
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<td>Robert J. Davidson</td>
<td>A and B</td>
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<td>Reinhard Hanselka</td>
<td>Safety updates need immediate attention</td>
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<td>Wade Palazini</td>
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<td>Terin Hopkins</td>
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<td>Kelly T. Nicolello</td>
<td>Agree</td>
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<tr>
<td>Raymond C. O’Brocki</td>
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</tbody>
</table>
A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen

Scott T. Laramee

I agree

Disagree 0

Abstain 0
SEE ATTACHED FOR REVISIONS

Substantiation: The current text of NFPA 1 contains extracts from the last published edition of NFPA 30A but not what is most currently available which is the 2021 Edition. This TIA updates the extracted language from NFPA 30A in NFPA 1 and makes other adjustments as necessary for the changes to the updated extract text.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The second draft report was not available during the NFPA 1 2nd draft report. Therefore, to ensure accuracy in the extract updates, the updates were done after the second draft report for the source document was posted. By waiting to update the extracts the final product in NFPA 1 will be more closely aligned to what is in the source document and ensures the most up to date information is contained in NFPA 1.

2.3.18 UL Publications.

UL 79A, Power-Operated Pumps for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85), 2015 (2016).

UL 87A, Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85), 2015 (2019).

UL 330A, Outline of Investigation for Hose and Hose Assemblies for Use with Dispensing Devices Dispensing Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85), 2018.

UL 567A, Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85), 2015 (2019).

UL 842A, Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85), 2015 (2019).

UL 2586A, Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85), 2015 (2019).

2.3.21 U.S. Government Publications.


2.4 References for Extracts in Mandatory Sections.


3.3.199.22 Motor Fuel Dispensing Facility.

That portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into approved containers, including all equipment used in connection therewith. [30A, 202118]

3.3.199.22.1 Fleet Vehicle Motor Fuel Dispensing Facility.

A motor fuel dispensing facility at a commercial, industrial, governmental, or manufacturing property where motor fuels are dispensed into the fuel tanks of motor vehicles that are used in connection with the business or operation of that property by persons within the employ of such business or operation. [30A, 202118]

3.3.199.22.2 Marine Motor Fuel Dispensing Facility.

A motor fuel dispensing facility at or adjacent to shore, a pier, a wharf, or a floating dock where motor fuels are dispensed into the fuel tanks of marine craft. [30A, 202118]
3.3.199.22.3 *Motor Fuel Dispensing Facility Located Inside a Building.*
That portion of a motor fuel dispensing facility located within the perimeter of a building or building structure that also contains other occupancies. [30A, 2021]8

A.3.3.199.22.3 Motor Fuel Dispensing Facility Located Inside a Building.
The motor fuel dispensing facility can be either enclosed or partially enclosed by the building walls, floors, ceilings, or partitions or can be open to the outside. The motor fuel dispensing area is that area required for dispensing of fuels to motor vehicles. Dispensing of fuel at manufacturing, assembly, and testing operations is not included within this definition. [30A, 2021]8

3.3.279.1 Aboveground Storage Tank.
A horizontal or vertical tank that is listed and intended for fixed installation, without backfill, above or below grade and is used within the scope of its approval or listing. [30A, 2021]8

30.1.6.6 Number of Vehicles Simultaneously Served.

30.1.6.6.1 The fuel dispensing area shall be limited to that required to serve not more than four vehicles at one time. [30A:7.3.6.6.1]

30.1.6.6.2 Exception: At a fleet vehicle motor fuel dispensing facility inside a building, where only Class II and Class III liquids are dispensed at fleet vehicle motor fuel dispensing facilities, the number of vehicles serviced at any one time shall be permitted to be increased to 12. [30A:7.3.6.6.2]

30.1.6.7* Mechanical Exhaust System.

30.1.6.7.1 A mechanical exhaust system that serves only the fuel dispensing area shall be provided when two or more sides of the dispensing area are not open to the building exterior. [30A:7.3.6.7.1]

30.1.6.7.2 A mechanical exhaust system that serves only the fuel dispensing area shall be provided. This system shall meet all of the following requirements:

(1) The system shall be interlocked with the dispensing system so that airflow is established before any dispensing device can operate. Failure of airflow shall automatically shut down the dispensing system.

(2) The exhaust system shall be designed to provide air movement across all portions of the floor of the fuel dispensing area and to prevent the flowing of ignitable vapors beyond the dispensing area.
(3) Exhaust inlet ducts shall not be less than 3 in. (76 mm) or more than 12 in. (305 mm) above the floor. Exhaust ducts shall not be located in floors or penetrate the floor of the dispensing area. Exhaust ducts shall discharge to a safe location outside the building.

(4) The exhaust system shall provide ventilation at a rate of not less than 1 ft³/min/ft² (0.3 m³/min/m²) of floor area, based on the fuel dispensing area.

(5) The exhaust system shall meet all applicable requirements of NFPA 91. [30A:7.3.6.7.2]

Exception: The provisions of 30.1.6.7 shall not apply to a fuel dispensing area located inside a building if two or more sides of the dispensing area are open to the building exterior. [30A:7.3.6.7]

30.2.3 Means of Egress.
In a repair garage, the required number, location, and construction of means of egress shall meet all applicable requirements for special purpose industrial occupancies, as set forth in NFPA 101, or as determined in accordance with the adopted building code. [30A:7.4.23]

30.2.4 Drainage.
In areas of repair garages used for repair or servicing of vehicles, floor assemblies shall be constructed of noncombustible materials or, if combustible materials are used in the assembly, they shall be surfaced with approved, nonabsorbent, noncombustible material, except as indicated in 30.2.4.1. [30A:7.4.34]

30.2.4.1
Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not more than 9.87 Btu/in.² (0.45 W/cm²), as determined by NFPA 253, shall be permitted. [30A:7.4.34.1]

30.2.4.2
Floors shall be liquidtight to prevent the leakage or seepage of liquids and shall be sloped to facilitate the movement of water, fuel, or other liquids to floor drains. [30A:7.4.34.2]

30.2.4.3
In areas of repair garages where vehicles are serviced, any floor drains shall be properly trapped and shall discharge through an oil/water separator to the sewer or to an outside vented sump. [30A:7.4.34.3]

30.2.5 Fixed Fire Protection.
Automatic sprinkler protection installed in accordance with the requirements of Section 13.3 shall be provided throughout all buildings containing major repair garages, as herein defined, when any one of the following conditions exist:

(1) The building housing the major repair garage is two or more stories, including basements, and the aggregate area of the major repair garage exceeds 10,000 ft² (930 m²).

(2) The major repair garage is one story and exceeds 12,000 ft² (1115 m²).

(3) The major repair garage is servicing vehicles parked in the basement of the building. [30A:7.4.56]
30.2.6 Gas Detection System.
Repair garages used for repair of vehicle engine fuel systems fueled by nonodorized gases shall be provided with an approved flammable gas detection system. Gas detection systems in repair garages for hydrogen vehicles shall be in accordance with NFPA 2. [30A:7.4.67]

30.2.6.1.1
The flammable gas detection system shall be calibrated to the types of fuels or gases used by the vehicles to be repaired. [30A:7.4.6.1.1]

30.2.6.1.2
The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL). Gas detection shall also be provided in lubrication or chassis repair pits of repair garages used for repairing non-odorized LNG/CNG-fueled vehicles. [30A:7.4.6.1.27.1]

30.2.6.2 Operation.
Activation of the gas detection system shall result in all of the following:
(1) Initiation of distinct audible and visual alarm signals in the repair garage
(2) Deactivation of all heating systems located in the repair garage
(3) Activation of the mechanical ventilation system, when the system is interlocked with gas detection

30.2.6.3 Failure of the Gas Detection System.
Failure of the gas detection system shall result in the deactivation of the heating system and activation of the mechanical ventilation system and, where the ventilation system is interlocked with gas detection, shall cause a trouble signal to sound in an approved location. [30A:7.4.67.3]

30.2.6.4 System Integrity.
The circuits of the detection system required by 30.2.6 shall be monitored for integrity in accordance with NFPA 72. [30A:7.4.67.4]

A.30.2.7
The ventilation requirements contained in this subsection do not consider exhaust emissions from motor vehicle engines. An appropriate professional should be consulted to determine precautions necessary to protect against this health hazard. [30A:A.7.5]

30.2.8.2 Listing and Restricted Locations.
30.2.8.2.1
Heat-producing appliances shall be listed for use in classified areas. [30A:7.6.2.1] of an approved type.
30.2.8.3  Solid fuel stoves, improvised furnaces, salamanders, or space heaters shall not be permitted in areas of repair garages used for repairing or servicing of vehicles or in a fuel dispensing area. [30A:7.6.2.2]

**Exception No. 1:** Unit heaters, when installed in accordance with Chapter 7 of NFPA 30A, need not meet this requirement.

30.2.8.4  Exception No. 2: Heat-producing equipment for any lubrication room or service room where there is no dispensing or transferring of Class I or Class II liquids or LP-Gas, when installed in accordance with Chapter 7 of NFPA 30A, need not meet this requirement. [30A:7.6.2.3]

30.2.8.3  Heat-producing appliances shall be permitted to be installed in a special room that is separated from areas that are classified as Division 1 or Division 2, in accordance with Chapter 8 of NFPA 30A, by walls that are constructed to prevent the transmission of vapors, that have a fire resistance rating of at least 1 hour, and that have no openings in the walls that lead to a classified area within 8 ft (2.4 m) of the floor. Specific small openings through the wall, such as for piping and electrical conduit, shall be permitted, provided the gaps and voids are filled with a fire-resistant material to resist transmission of vapors. All air for combustion purposes shall be taken from outside the building. This room shall not be used for storage of combustible materials, except for fuel storage as permitted by the standards referenced in 30.2.8.119. [30A:7.6.3]

30.2.8.9  Heat-producing appliances shall be installed to meet the requirements of NFPA 31, NFPA 54, NFPA 82, NFPA 90A, and NFPA 211, as applicable, except as hereinafter specifically provided. [30A:7.6.9]

30.3.1.2 **Means of Egress.**

In a repair garage, the required number, location, and construction of means of egress shall meet all applicable requirements for special purpose industrial occupancies, as set forth in NFPA 101, or as determined in accordance with the adopted building code. [30A:7.4.23]

30.3.2 **CNG-Fueled Vehicles, LNG-Fueled Vehicles, LP-Gas-Fueled Vehicles.**

30.3.2.2 **Means of Egress.**

In a repair garage, the required number, location, and construction of means of egress shall meet all applicable requirements for special purpose industrial occupancies, as set forth in NFPA 101, or as determined in accordance with the adopted building code. [30A:7.4.23]

30.3.2.3 **Drainage.**

In areas of repair garages used for repair or servicing of vehicles, floor assemblies shall be constructed of noncombustible materials or, if combustible materials are used in the assembly, they shall be surfaced with approved, nonabsorbent, noncombustible material, except as indicated in 30.2.4.130.3.2.3.1. [30A:7.4.34]
30.3.2.3.1
Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not more than 9.87 Btu/in.² (0.45 W/cm²), as determined by NFPA 253, shall be permitted. [30A:7.4.34.1]

30.3.2.3.2
Floors shall be liquidtight to prevent the leakage or seepage of liquids and shall be sloped to facilitate the movement of water, fuel, or other liquids to floor drains. [30A:7.4.34.2]

30.3.2.3.3
In areas of repair garages where vehicles are serviced, any floor drains shall be properly trapped and shall discharge through an oil/water separator to the sewer or to an outside vented sump. [30A:7.4.34.3]

30.3.2.4.1
Pits, belowgrade work areas, and subfloor work areas used for lubrication, inspection, and minor automotive maintenance work shall comply with the provisions of this chapter, in addition to other applicable requirements of NFPA 30A. [30A:7.4.45.1]

30.3.2.4.2
Walls, floors, and structural supports shall be constructed of masonry, concrete, steel, or other approved noncombustible materials. [30A:7.4.45.2]

30.3.2.4.3
In pits, belowgrade work areas, and subfloor work areas, the required number, location, and construction of means of egress shall meet the requirements for special purpose industrial occupancies in Chapter 40 of NFPA 101, or as determined in accordance with the adopted building code. [30A:7.4.45.3]

30.3.2.4.4
Pits, belowgrade work areas, and subfloor work areas shall be provided with exhaust ventilation at a rate of not less than 1 ft³/min/ft² (0.3 m³/min/m²) of floor area at all times that the building is occupied or when vehicles are parked in or over these areas. Exhaust air shall be taken from a point within 12 in. (0.3 m) of the floor. [30A:7.4.45.4]

30.3.2.6 Gas Detection System.
Repair garages used for repair of vehicle engine fuel systems fueled by nonodorized gases shall be provided with an approved flammable gas detection system. Gas detection systems in repair garages for hydrogen vehicles shall be in accordance with NFPA 2. [30A:7.4.67]

30.3.2.6.1 System Design.
**30.3.2.6.1 System Design.**

The flammable gas detection system shall be calibrated to the types of fuels or gases used by vehicles to be repaired. [30A:7.4.6.1.1]

**30.3.2.6.2 Operation.**

Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals in the repair garage
2. Deactivation of all heating systems located in the repair garage
3. Activation of the mechanical ventilation system, when the system is interlocked with gas detection

[30A:7.4.6.7.2]

**30.3.2.6.3 Failure of the Gas Detection System.**

Failure of the gas detection system shall result in the deactivation of the heating system and activation of the mechanical ventilation system and, where the ventilation system is interlocked with gas detection, shall cause a trouble signal to sound in an approved location. [30A:7.4.6.7.3]

**30.3.2.6.4 System Integrity.**

The circuits of the detection system required by 30.3.2.6 shall be monitored for integrity in accordance with NFPA 72. [30A:7.4.6.7.4]

**30.3.2.8.1**

Heat-producing appliances shall be installed in accordance with the requirements of 30.3.2.8. They shall be permitted to be installed in the conventional manner except as provided in 30.3.2.8. [30A:7.6.1]

**30.3.2.8.2 Listing and Restricted Locations.**

**30.3.2.8.2.1**

Heat-producing appliances shall be listed for use in classified areas. [30A:7.6.2.1] of an approved type.

**30.3.2.8.3 Solid Fuel Stoves, Improvised Furnaces, Salamanders, and Space Heaters.**

Solid fuel stoves, improvised furnaces, salamanders, and space heaters shall not be permitted in areas of repair garages used for repairing or servicing of vehicles or in a fuel dispensing area. [30A:7.6.2.2]
### Exception No. 1: Unit heaters, when installed in accordance with Chapter 7 of NFPA 30A, need not meet this requirement.

### 30.3.2.8.3
Exception No. 2: Heat-producing equipment for-in any lubrication room or service room where there is no dispensing or transferring of Class I or Class II liquids or LP-Gas, when installed in accordance with Chapter 7 of NFPA 30A, need not meet this requirement shall be listed. [30A:7.6.2.3]

### 30.3.2.8.9
Heat-producing appliances shall be installed to meet the requirements of NFPA 31, NFPA 54, NFPA 82, NFPA 90A, and NFPA 211, as applicable, except as hereinafter specifically provided. [30A:7.6.9]

### 30.3.3 CNG Fueled Vehicles and LNG Fueled Vehicles

#### 30.3.3.1 Applicability

Paragraph 30.3.3 shall apply to the construction of new buildings, existing buildings, and portions of buildings serving as repair garages and repair areas for CNG and LNG vehicles. [30A:7.8.1.1]

#### 30.3.3.2 Occupancy Classification

The occupancy classification of a repair garage shall be a special purpose industrial occupancy as defined in NFPA 101 or as determined in accordance with the adopted building code. [30A:7.8.2]

#### 30.3.3.3 Means of Egress

In a repair garage, the required number, location, and construction of means of egress shall meet all applicable requirements for special purpose industrial occupancies as set forth in NFPA 101 or as determined in accordance with the adopted building code. [30A:7.8.3]

#### 30.3.3.4 Definition and Classification of Repair Areas Serving CNG and LNG Vehicle Repair

##### 30.3.3.4.1 Applicability

This paragraph shall classify repair areas for CNG and LNG vehicles based on vehicle fuel system pressure status and permissible repair activities. [30A:7.8.4.1]

##### 30.3.3.4.2 CNG Repair Area Classification

CNG vehicle repair areas shall be classified according to Table 30.3.3.4.2. [30A:7.8.4.2]
Table 30.3.3.4.2 Repair Area Classification Assignment for CNG Vehicles [30A:Table 7.8.4.2]

<table>
<thead>
<tr>
<th>Vehicle Status – Fuel System Pressure (psig) (Not to Exceed 3600 psig)</th>
<th>Type of Repair</th>
<th>Minimum Repair Area Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤500</td>
<td>Minor ongoing repair work or unattended vehicle storage while undergoing minor repair</td>
<td>Minor repair area</td>
</tr>
<tr>
<td>≤500</td>
<td>Major ongoing repair work or unattended vehicle storage while undergoing major repair</td>
<td>Major repair area</td>
</tr>
<tr>
<td>&gt;500</td>
<td>Ongoing major or minor repair work or unattended vehicle storage while undergoing major or minor repair</td>
<td>Major repair area</td>
</tr>
</tbody>
</table>

30.3.3.4.3 LNG Repair Area Classification.

LNG vehicle repair areas shall be classified according to Table 30.3.3.4.3. [30A:7.8.4.3]

Table 30.3.3.4.3 Repair Area Classification Assignment for LNG Vehicles [30A:Table 7.8.4.3]

<table>
<thead>
<tr>
<th>Vehicle Fuel System Liquid Content Status (Onboard Fuel)</th>
<th>Type of Vehicle Repair</th>
<th>Minimum Repair Area Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65% of tank MAWP*</td>
<td>Minor ongoing repair work or unattended vehicle storage while undergoing minor repair</td>
<td>Minor (ongoing repair work) or major repair area (unattended vehicle storage)</td>
</tr>
<tr>
<td>Any liquid volume</td>
<td>Major ongoing repair work or unattended vehicle storage while undergoing major repair</td>
<td>Major repair</td>
</tr>
</tbody>
</table>

*See 30.3.3.4.3.1 and 30.3.3.4.3.2.

30.3.3.4.3.1

All vehicles upon first entering the facility shall have a tank pressure less than 65 percent of the tank maximum allowable working pressure (MAWP) as per the ASME Boiler Pressure Vessel Code. [30A:7.8.4.3.1]
30.3.3.4.3.2
High-pressure fuel systems shall be depressurized in accordance with the original equipment manufacturers’ recommended maintenance procedures. [30A:7.8.4.3.2]

30.3.3.5 Drainage.
In areas of repair garages used for repair or servicing of vehicles, floor assemblies shall be constructed of noncombustible materials or combustible materials. [30A:7.8.5]

30.3.3.5.1
If combustible materials are used in the floor assembly, they shall meet the provisions of 30.3.3.5.2. [30A:7.8.5.1]

30.3.3.5.2
Combustible materials used in the floor assembly shall be surfaced with approved, nonabsorbent, noncombustible material, except as indicated in 30.3.3.5.3. [30A:7.8.5.2]

30.3.3.5.3
Major repair garages and major repair areas serving LNG-fueled vehicles shall comply with the following:

(1) Floor drains shall be designed with consideration for spilled LNG entering the drain.
(2) Drains shall be designed to prevent excessive pressure buildup.
(3) Drains shall not allow the migration of gas or liquid to adjacent areas of the facility. [30A:7.8.5.3]

30.3.3.5.4
Where installed, slip-resistant, nonabsorbent interior floor finishes shall have a critical radiant flux of not more than 0.0045 W/cm² (9.87 Btu/in.²), as determined by NFPA 253. [30A:7.8.5.4]

30.3.3.5.5
Floors shall be liquidtight to prevent the leakage or seepage of liquids and be sloped to facilitate the movement of water, fuel, or other liquids to floor drains. [30A:7.8.5.5]

30.3.3.5.6
In areas of repair garages where vehicles are serviced, floor drains shall be properly trapped and discharge through an oil/water separator either to the sewer or to an outside vented sump. [30A:7.8.5.6]

30.3.3.6 Construction Requirements of CNG and LNG Repair Areas.
In repair garages or areas where CNG or LNG vehicles are repaired, all the applicable requirements of NFPA 52 shall be met. [30A:7.8.6]
30.3.3.7 Roofs and Ceilings — Major and Minor Repair Areas.

30.3.3.7.1 Roof and ceiling structures — and their accessories or attachments — shall be constructed to not impede the free movement of gas toward ventilation fans and gas sensor locations. [30A:7.8.7.1]

30.3.3.7.2* Where gas movement in roof and ceiling structures is impeded, provisions to mitigate gas holdup shall be made. [30A:7.8.7.2]

A.30.3.3.7.2 Roof and ceiling designs should minimize the potential impact of pockets and recesses in roofs and ceilings, such as those created by skylights, ceiling geometry, or other features, and should be ventilated, if necessary, to prevent gas buildup. Gas holdup areas such as those created by mezzanines, subfloors, gaps or spaces between beams and ceilings, holes along the beams’ neutral axes, and other features should include provisions for ventilation and gas detection, if required, to prevent gas buildup. [30A:A.7.8.7.2]

30.3.3.8 Walls and Partitions — Major and Minor Repair Areas.

30.3.3.8.1* Walls and partitions separating major repair areas from other repair spaces, including mechanical equipment rooms, shall be constructed to minimize the migration of natural gas to the other repair spaces. [30A:7.8.8.1]

A.30.3.3.8.1 Other garage spaces, such as parts rooms and mechanical rooms that are not continuously occupied, should support repair operations. [30A:A.7.8.8.1]

30.3.3.8.2 Walls and partitions separating major repair areas from occupied spaces other than repair areas shall be gastight. [30A:7.8.8.2]

30.3.3.8.3 Walls and partitions shall have a fire resistance rating of not less than 1 hour as defined in NFPA 101 or as determined in accordance with the adopted building code. [30A:7.8.8.3]

30.3.3.8.4 Penetrations of gastight walls for ducts, pipes, conduits, and structural members shall be sealed to prevent migration of natural gas. [30A:7.8.8.4]
30.3.3.8.5  
Hinged doors separating major repair areas from all other interior areas shall be in accordance with the following:
   (1) Be self-closing and equipped with seals
   (2) Not be equipped with baffles, louvres, or other penetrations

30.3.3.8.6  
Rollup doors separating major repair areas from all other interior areas shall remain closed when not in use.

30.3.3.8.7  
Windows located in walls or partitions separating major repair areas from other spaces shall be self-closing or non-opening.

30.3.3.9  Pits, Belowgrade Work Areas, and Subfloor Work Areas.

30.3.3.9.1  
Pits, belowgrade work areas, and subfloor work areas in CNG and LNG vehicle repair areas shall meet the requirements of 30.3.2.4.

30.3.3.9.2  
Pits used in major repair garages for CNG and LNG vehicles shall have a continuous ventilation system as per Table 8.3.3 of NFPA 30A or a ventilation system that is initiated automatically upon the detection of a gas concentration of 25 percent of the lower flammable limit (LFL).

30.3.3.9.3  
Pit ventilation systems shall have provisions for manual activation inside and outside of the pit.

30.3.3.9.4  
Manual activation shall not defeat the automatic activation stipulated in 30.3.3.9.2.

30.3.3.10 Fixed Fire Protection.  
CNG and LNG vehicle repair areas shall meet the requirements of 30.2.5.

30.3.3.11 Gas Detection System.
Repair areas and overnight vehicle storage areas in garages servicing CNG and LNG vehicles shall be provided with an approved flammable gas detection system. [30A:7.8.11]

**30.3.3.11 System Design.**

The flammable gas detection system shall be calibrated to the types of fuels or gases used by the vehicles to be repaired. [30A:7.8.11.1]

**30.3.3.11.1**

The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the LFL. [30A:7.8.11.1.1]

**30.3.3.11.2**

Gas detection shall also be provided in lubrication or chassis repair pits in buildings serving LNG vehicles. [30A:7.8.11.1.2]

**30.3.3.11.2* Operation.**

Activation of the gas detection system shall result in all of the following automatic actions:

1. Initiation of distinct audible and visual alarm signals in the repair garage
2. Deactivation of all heating systems located in the repair garage
3. De-energization of all spark-producing electrical systems and components and motors within 455 mm (18 in.) of the ceiling
4. Activation of the purge ventilation system as specified in 30.3.3.12.4

[30A:7.8.11.2]

**A.30.3.3.11.2**

Automatic actions can be implemented by installing power isolation systems, such as normally closed solenoids or other devices, that do not require power to activate. [30A:A.7.8.11.2]

**30.3.3.11.3 Failure of the Gas Detection System.**

**30.3.3.11.3.1**

Failure of the gas detection system shall result in the deactivation of the heating system and the activation of the mechanical ventilation system. [30A:7.8.11.3.1]

**30.3.3.11.3.2**

Where the ventilation system is interlocked with gas detection, failure of the gas detection system shall cause a trouble signal to sound in an approved location. [30A:7.8.11.3.2]

**30.3.3.11.4 System Integrity.**

The circuits of the detection system required by 30.3.9 shall be monitored for integrity. [30A:7.8.11.4]
30.3.3.12 Heating, Ventilating, and Air Conditioning

30.3.3.12.1 Heating, ventilating, and air conditioning of repair garages and repair areas for servicing CNG and LNG vehicles shall meet the requirements of 30.2.7.1, 30.2.7.2, 30.2.7.3. [30A:7.8.12.1]

30.3.3.12.2 Exhaust duct openings shall be located so that they effectively remove vapor accumulation at floor level from all parts of the floor area. [30A:7.8.12.2]

30.3.3.12.3 Exhaust duct openings shall be located so that they effectively remove vapor accumulations at the ceiling level within 455 mm (18 in.) of the ceiling. [30A:7.8.12.3]

30.3.3.12.4 Where required, purge ventilation shall comply with 30.3.3.12.4.1, 30.3.3.12.4.2, and 30.3.3.12.4.3. [30A:7.8.12.4]

30.3.3.12.4.1 Capacity.
The purge ventilation capacity required for major repair areas shall be determined in accordance with the maintenance room volume as per Table 30.3.3.12.4.1. [30A:7.8.12.4.1]

Table 30.3.3.12.4.1 Minimum Purge Ventilation Requirements for Major Repair Areas [30A:Table 7.8.12.4.1]

**INSERT TABLE 7.8.12.4.1 FROM NFPA 30A**

30.3.3.12.4.2* Minor Repair Areas.
For minor repair areas, a minimum purge ventilation rate of two air changes per hour (ACH) shall be provided. [30A:7.8.12.4.2]

A.30.3.3.12.4.2
For vehicle repair garages, the International Mechanical Code requires a ventilation rate of 0.23 m³/min per m² (0.75 cfm/ft²) minimum. At a ceiling height of 7 m (23 ft), this translates to an air change rate of two ACH. [30A:A.7.8.12.4.2]

30.3.3.12.4.3 Minimum Ventilation.

30.3.3.12.4.3.1
Ventilation shall meet the requirements of applicable mechanical standards, building codes, or local regulations. [30A:7.8.12.4.3.1]

30.3.3.12.4.3.2
In no case shall ventilation be less than 0.5 ACH. [30A:7.8.12.4.3.2]

30.3.3.12.4.3.3
Natural or mechanical ventilation shall extract air from within 0.5 m (20 in.) of the ceiling. [30A:7.8.12.4.3.3]

30.3.3.13  Heat-Producing Appliances and Other Sources of Ignition.

30.3.3.13.1
Heat-producing appliances shall be listed and installed in accordance with the manufacturer’s instructions, governing codes, and the requirements of this section. [30A:7.8.13.1]

30.3.3.13.2
Solid fuel stoves, improvised furnaces, salamanders, and portable space heaters shall not be permitted. [30A:7.8.13.2]

30.3.3.13.3
The following shall be considered potential sources of ignition and prohibited from locations as specified elsewhere in this code for CNG and LNG vehicle repair areas:

1. Open flame heaters
2. Heating systems and other equipment either not employing sealed combustion or with exposed surface temperatures exceeding 399°C (750°F)
3. Unit heaters
4. Water heaters not employing sealed combustion
5. Fired pressure washers
6. Arcing and sparking tools or equipment
7. Gas-fired cutting torches

[30A:7.8.13.3]

30.3.3.13.4  Fired Heating Equipment.

30.3.3.13.4.1
Fired heating equipment installed in minor repair areas for CNG and LNG vehicles shall meet the following requirements:
(1) Fired heating equipment shall be located with flame and combustion air inlet elevation a minimum of 0.61 m (24 in.) above the floor level and a minimum of 1.1 m (42 in.) below the ceiling.

(2) Fired heating equipment and its combustion air intake shall not be located directly above where a vehicle is normally parked for servicing.

(3) Fired heating equipment shall be located a minimum horizontal distance of 1 m from all parts of the vehicle.

30.3.3.13.4.2
Where permitted by the manufacturer’s installation instructions, 30.3.3.13.4.1 shall not apply to radiant heaters with surface temperatures not exceeding 399°C (750°F).

30.3.3.14  CNG and LNG Defueling Equipment.

30.3.3.14.1  General.

30.3.3.14.1.1
Installation of equipment for defueling CNG and LNG vehicles for repair and other purposes shall be in accordance with the following requirements:

(1) Defueling equipment and installations shall be designed in accordance with applicable codes and standards.

(2) Defueling equipment and installations shall be approved by the authority having jurisdiction.

(3) Defueling and captive vent systems and equipment shall be designed to recover, store, flare, or vent gas in a safe manner.

(4) Where gas is vented, the vent outlet shall comply with the following:
   (a) Be a minimum of 4.5 m (15 ft) away from building ventilation and heating and air-conditioning exhaust and intake locations
   (b) Be at a minimum elevation of 3 m (10 ft) above surrounding buildings or equipment within 15 m (50 ft) of the vent location
   (c) Be directed in a vertically upward direction
   (d) Have an electrical area classification in accordance with Table 8.3.3 of NFPA 30A

30.3.3.14.2
Defueling equipment and captive vent piping systems shall be designed in accordance with CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code, or ASME B31.3, Process Piping, where applicable.

30.3.3.14.3
The location of defueling equipment shall consider the safe movement and parking of the defueling vehicle, as well as other vehicular traffic. [30A:7.8.14.3]

30.3.3.14.4
Defueling equipment shall be protected from vehicle impact. [30A:7.8.14.4]

30.3.3.14.5
The flexible hoses of the defueling equipment shall be designed to minimize the potential for hose contact with the ground, accidental hose damage, and tripping hazards. [30A:7.8.14.5]

30.3.3.14.6 Bonding and Grounding.

30.3.3.14.6.1
All defueling equipment, hoses, and piping systems shall be bonded to a common ground. [30A:7.8.14.6.1]

30.3.3.14.6.2
Convenient bonding of vehicle fuel containers to decanting equipment shall be provided. [30A:7.8.14.6.2]

30.3.3.14.6.3
The defueling hose shall be electrically conductive. [30A:7.8.14.6.3]

30.3.3.14.7 Captive Vent Systems.

30.3.3.14.7.1
Major and minor repair areas that have LNG vehicles parked for extended periods of time shall have provisions for a captive vent system to safely vent boil-off gas from the vehicle fuel container to a safe outdoor location. [30A:7.8.14.7.1]

30.3.3.14.7.2
The captive vent system shall be designed with engineering supervision. [30A:7.8.14.7.2]

30.3.3.14.7.3
The LNG captive vent system shall meet the following requirements:

1. The captive vent system shall be designed for cryogenic temperatures and have a design pressure rating in accordance with the highest potential vent flow pressure.
2. The captive vent piping system shall be without any in-line valves.
3. A single captive vent shall not serve more than one vehicle fuel container.
4. The captive vent systems using cryogenic flexible hoses shall be designed to minimize the potential for hose contact with the floor, accidental hose damage, and tripping hazards.
The captive vent system hoses and piping systems shall be electrically conductive and grounded. Convenient bonding of the vehicle fuel container to the captive vent system shall be provided. [30A:7.8.14.7.3]

42.2.1.3 *
Sections 42.2 through 42.8 shall not apply to those motor fuel dispensing facilities where only liquefied petroleum gas (LP-Gas), liquefied natural gas (LNG), or compressed natural gas (CNG) is dispensed as motor fuel, or where both gaseous fuel storage and dispensing equipment are at least 50 ft (15 m) from any other motor fuel storage or dispensing equipment of different chemical composition. [30A:1.1.3]

A.42.2.1.3
See NFPA 2, NFPA 52, and NFPA 58 for requirements for facilities where only these fuels are dispensed. [30A:A.1.1.3]

42.3.2.1
Liquids shall be stored in the following:
(1) Approved closed containers that do not exceed 60 gal (227 L) capacity and are located outside buildings
(2) Tanks or approved closed containers located inside motor fuel dispensing facilities or repair garages
(3) Aboveground tanks, underground tanks, and containers in accordance with the requirements of Section 4.3 of NFPA 30A
(4) Tanks supplying marine service stations in accordance with 42.9.2. [30A:4.2.1]

42.3.3.1.3
Tanks shall be located in accordance with Table 42.3.3.1.3. [30A:4.3.2.4]

Table 42.3.3.1.3 Minimum Separation Requirements for Aboveground Tanks

<table>
<thead>
<tr>
<th>Tank Type</th>
<th>Individual Tank Capacity (gal)</th>
<th>From the Nearest Important Building on the Same Property</th>
<th>From Nearest Fuel Dispensing Device</th>
<th>From Lot Line That Is or Can Be Built Upon</th>
<th>From the Nearest Side of Any Public Way</th>
<th>Between Tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanks in vaults</td>
<td>0–15,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Separate compartments required for each tank</td>
</tr>
</tbody>
</table>
### 42.3.3.1.7 Spill Control.

#### 42.3.3.1.7.1

Aboveground tanks not installed in vaults shall be provided with spill control that meets the requirements of 66.21.7.1 and 66.22.11. [30A:4.3.2.8.1]

#### 42.3.3.1.7.2

Tank fill connections shall be provided with a noncombustible spill containment device. [30A:4.3.2.8.2]

**Exception:** Tanks installed in vaults that meet the requirements of 42.3.3.2 need not meet this requirement. [30A:4.3.2.8]

#### 42.3.3.2.3.1.1

The top of an abovegrade vault that contains a tank storing Class I liquid or Class II or Class III liquid stored at a temperature at or above its flash point shall be constructed of noncombustible material and shall be designed to be weaker than the walls of the vault to ensure that the thrust of any explosion occurring inside the vault is directed upward before destructive internal pressure develops within the vault. [30A:4.3.3.3.1.1]

#### 42.3.3.2.3.1.2

The top of an at-grade or belowgrade vault that contains a tank storing Class I liquid or Class II or Class III liquid stored at a temperature at or above its flash point shall be designed to relieve or contain the force of any explosion occurring inside the vault. [30A:4.3.3.3.1.2]

#### 42.3.3.2.5.1

Vent pipes that are provided for normal tank venting shall terminate outside the vault and at least 12 ft (3.6 m) above ground level and shall meet the requirements of 66.27.7.1. [30A:4.3.3.5.1]
42.3.3.2.5.4
Fill connections for vaults installed inside buildings shall comply with 66.22.13.4. [30A:4.3.3.5.4]

42.3.3.6.1 Security.

42.3.3.6.1.1
Tanks that are not enclosed in vaults shall be enclosed by a perimeter property security fence or a separate with a chain link fence, at least 6 ft (1.8 m) high. [30A:4.3.7.1.1]

42.3.3.6.1.2
The perimeter property security or separate chain link fence shall be separated from the tanks by at least 10 ft (3 m) and shall have a gate that is secured against unauthorized entry. [30A:4.3.7.1.2]

42.3.3.6.1.3
Exception: Tanks are not required to be enclosed with a fence if the property on which the tanks are located has a perimeter security fence. [30A:4.3.7.1.3]

42.3.3.7 Corrosion Protection.
Any portion of a tank or its piping that is in contact with the soil shall have properly engineered, installed, and maintained corrosion protection that meets the requirements of 66.21.4.5. [30A:4.3.8]

42.3.3.8 Storage of Liquids Inside Buildings.
Storage of flammable and combustible liquids in motor fuel dispensing facility buildings and in repair garage buildings shall meet the requirements of this subsection 42.3.3.8. [30A:4.3.9]

42.3.3.8.3 Class IIIB Liquids.
The quantity of Class IIIB liquids in storage shall not be limited. Class IIIB liquids shall be permitted to be stored in and dispensed from tanks and containers that meet the requirements of Chapter 9 and Chapters 21 through 23 of NFPA 30, as applicable. Tanks storing Class IIIB liquids inside buildings shall be permitted to be located at, below, or above grade. Adequate drainage shall be provided. Tanks and containers that contain only crankcase drainings shall be considered as containing Class IIIB liquids. [30A:4.3.9.3]

42.4.2.1
The design, fabrication, assembly, test, and inspection of the piping system shall meet the requirements of Section 66.27.

Exception No. 1: Where dispensing is from a floating structure or pier, approved oil-resistant flexible hose shall be permitted to be used between shore piping and the piping on the floating structure or pier.
and between separate sections of the floating structure to accommodate changes in water level or shoreline, provided that the hose is either resistant to or shielded from damage by fire.

Exception No. 2: Low melting point rigid piping shall be permitted to be used between underground shore piping and a floating structure or pier and on the floating structure or pier itself, provided that the piping is protected from physical damage and stresses arising from impact, settlement, vibration, expansion, contraction, or tidal action and provided that the hose is either resistant to or shielded from damage by fire exposure. [30A:5.2.1]

42.4.2.7

Piping components made of low melting point materials shall be permitted to be used without backfill with the following sumps:

1. Belowgrade underground tank sumps that are fitted with a cover
2. Belowgrade piping connection sumps that are fitted with a cover
3. Containment sumps, under the following conditions:
   a. The sump is monitored to detect any leaks.
   b. Any leaks can be controlled.
   c. The components are either resistant to or shielded from damage by fire exposure.
4. Containment sumps, provided the piping components can successfully pass the test procedures described in API 607, *Fire Test for Soft-Seated Quarter-Turn Valves and Valves Equipped with Nonmetallic Seats* [30A:5.2.7]

42.5.2.3 *

Fuel dispensing systems, including dispensers, hoses, nozzles, breakaway fittings, swivels, flexible connectors, dispenser emergency shutoff valves, vapor recovery systems, and pumps that are used for alcohol-blended motor fuels shall be listed or approved for the specific purpose. [30A:6.2.3] and in accordance with the following:

**A.42.5.2.3.**

The following can be used to determine compliance with 42.5.2.3:

- UL 79A, *Power-Operated Pumps for Petroleum Dispensing Products Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*
- UL 87, *Power-Operated Pumps for Petroleum Dispensing Products*
- UL 87A, *Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0—E85)*
- UL 330A, *Outline of Investigation for Hose and Hose Assemblies for Use with Dispensing Flammable Liquids Devices Dispensing Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*
- UL 567A, *Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Petroleum*
42.5.3.2
Dispensing devices for Class I and Class II liquids shall be listed. [30A:6.3.2]

42.5.3.4
Dispensing devices shall be mounted on a concrete island or shall otherwise be protected against collision damage by means acceptable to the AHJ. Dispensing devices shall be securely bolted in place. If located indoors, dispensing devices shall also be located in a position where they cannot be struck by a vehicle that is out of control descending a ramp or other slope. Dispensing devices shall be installed in accordance with the manufacturer's instructions. [30A:6.3.4]

A.42.5.3.6.1
Useful forms for documentation can be found in PEI/RP500-05, Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment, and are available at www.pei.org/rp500. [30A:A.6.3.6.1]

42.5.3.9
Where liquid is supplied to the dispensing device under pressure, a listed, rigidly anchored, double-poppet type emergency shutoff valve incorporating a fusible link or other thermally actuated device, designed to close automatically in the event of severe impact or fire exposure, shall be installed in the supply line at the base of each individual island-type dispenser or at the inlet of each overhead dispensing device. [30A:6.3.9]

42.5.3.9.1
The emergency shutoff valve shall be installed in accordance with the manufacturer's instructions. [30A:6.3.9.1]

42.5.3.9.2
The emergency shutoff valve shall not incorporate a slip-joint feature. [30A:6.3.9.2]

Exception: As provided for in 42.5.3.10. [30A:6.3.9]
The automatic-closing feature of this valve shall be tested at the time of installation and at least once a year thereafter by manually tripping the hold-open linkage. Records of such tests shall be kept at the premises or shall be made available for inspection by the AHJ within 24 hours of a verbal or written request. [30A:6.3.9.34]

**42.5.4.2 Leak Detection.**

**42.5.4.2.1** Where all discharge piping is not visible, each pump shall have installed on the discharge side a listed leak detection device that will provide an audible indication or a visible indication or that will restrict or shut off the flow of product if the piping or a dispenser is leaking. [30A:6.4.2.1]

**42.5.4.2.2** Each leak-detecting device shall be checked and tested at least annually according to the manufacturers' specifications to ensure proper installation and operation. [30A:6.4.2.2]

Exception: A leak detection device shall not be required if all piping is visible. [30A:6.4.2]

**42.5.5.3** Where hose are attached to a hose-retrieving mechanism, the listed emergency breakaway device shall be installed between the point of attachment of the hose-retrieving mechanism to the hose and the hose nozzle valve.

Exception: Such devices shall not be required at marine motor fuel dispensing facilities. [30A:6.5.3]

**42.5.6.3 Automatic Closing Valve.**

**42.5.6.3.1** Overhead-type dispensing devices shall be provided with a listed, automatic closing–type hose nozzle valve without a latch-open device. [30A:6.6.3.1]

**42.5.6.3.2** Exception: A listed, automatic closing–type hose nozzle valve with a latch-open device shall be permitted to be used if the hose nozzle valve will close automatically in the event the valve is released from a fill opening or upon impact. [30A:6.6.3.2]

**42.5.7.1** Fuel dispensing systems shall be provided with one or more clearly identified emergency shutoff devices or electrical disconnects. [30A:6.7.1]

**42.5.7.2**
Such emergency shutoff devices or electrical disconnects shall be installed in approved locations, but not less than 20 ft (6 m) or more than 100 ft (30 m) from the fuel dispensing devices that they serve. [30A:6.7.2]

42.5.7.3
Emergency shutoff devices or electrical disconnects shall disconnect power to all dispensing devices not supplied by circuits that are identified to be intrinsically safe; to all remote pumps serving the dispensing devices; to all associated power, control, and signal circuits; and to all other electrical equipment in the hazardous (classified) locations surrounding the fuel dispensing devices. [30A:6.7.3]

42.5.7.4
Emergency shutoff devices or electrical disconnects shall mechanically or electrically isolate other fluid transfer systems serving the fuel dispensing area. [30A:6.7.4]

42.5.7.5
Intrinsically safe electrical equipment shall not be required to be disconnected by the emergency shutoff device or the electrical disconnect. [30A:6.7.5]

42.5.7.6
When more than one emergency shutoff device or electrical disconnect is provided, all devices shall be interconnected. [30A:6.7.6]

42.5.7.7
Resetting from an emergency shutoff condition shall require manual intervention, and the manner of resetting shall be approved by the AHJ. [30A:6.7.7]

Exception: Intrinsically safe electrical equipment need not meet this requirement. [30A:6.7]

42.5.7.94
At attended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to the attendant and labeled with an approved sign stating “EMERGENCY FUEL SHUTOFF” or equivalent language. [30A:6.7.94]

42.5.7.10
Unattended Motor Fuel Dispensing Facilities.

42.5.7.10.12
At unattended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to patrons. [30A:6.7.10.1]
42.5.7.10.2
At least one additional device or disconnect shall be readily accessible to each group of dispensing devices on an individual island. [30A:6.7.10.2]

42.5.7.10.3
The device(s) or disconnect(s) shall be labeled with an approved sign stating “EMERGENCY FUEL SHUTOFF” or equivalent language. [30A:6.7.10.3]

42.7.1 Scope.
Section 42.7 applies to those requirements that relate to the operation of motor fuel dispensing facilities, fuel dispensing systems, repair garages, and repair areas. [30A:9.1]

A.42.7.2.1
API RP 1621, Recommended Practice for Bulk Liquid Stock Control at Retail Outlets, provides information on this subject. [30A:A.9.2.1]

42.7.2.2.1
Delivery operations shall meet all applicable requirements of NFPA 385 and the requirements of 42.7.2.2.3 through 42.7.2.2.6. [30A:9.2.2.1]

42.7.2.2.3
The delivery vehicle shall be separated from any aboveground tank in accordance with Table 42.7.2.2.3. [30A:9.2.2.3]

Table 42.7.2.2.3 Minimum Separation Distances Between Delivery Vehicles and Aboveground Tanks

<table>
<thead>
<tr>
<th>Aboveground Tank Type</th>
<th>Separation Distance Between Delivery Vehicle and Aboveground Tank (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected aboveground tanks</td>
<td>0</td>
</tr>
<tr>
<td>Tanks in abovegrade vaults (measured from vault wall)</td>
<td>0</td>
</tr>
<tr>
<td>Tanks filled by gravity</td>
<td>0</td>
</tr>
<tr>
<td>Fire-resistant tanks</td>
<td>15</td>
</tr>
<tr>
<td>Other tanks meeting the requirements of NFPA 30 storing Class II or Class III liquids</td>
<td>15</td>
</tr>
<tr>
<td>Other tanks meeting the requirements of NFPA 30 storing Class I liquids</td>
<td>25</td>
</tr>
</tbody>
</table>

[30A:Table 9.2.2.3]

42.7.2.2.4 Delivery Vehicle Location.

42.7.2.2.4.1
The delivery vehicle shall be located so that all parts of the vehicle are on the premises when delivery is
Exception: This requirement shall not apply to existing fuel dispensing facilities and fuel dispensing facilities inside buildings. [30A:9.2.2.4]

42.7.2.4.2
Where fuel dispensing facilities are located inside buildings, the fuel delivery vehicle shall be permitted to be located off premises at approved locations. [30A:9.2.2.4.2]

42.7.2.4.3
Existing fuel dispensing facilities shall not be required to meet 42.7.2.4.1. [30A:9.2.2.4.3]

42.7.2.6
Tanks shall be filled through a liquidtight connection. [30A:9.2.2.6.5]

42.7.2.6.1
Where an aboveground tank is filled by means of fixed piping, either a check valve and shutoff valve with a quick-connect coupling or a check valve with a dry-break coupling shall be installed in the piping at a point where connection and disconnection is made between the tank and the delivery vehicle. This device shall be protected from tampering and physical damage. [30A:9.2.2.6.5.1]

42.7.2.6.2
Underground tanks and tanks in belowgrade vaults shall be filled through a liquidtight connection within a spill container. [30A:9.2.2.6.5.2]

42.7.2.6.2 Fire Extinguishers.

A.42.7.2.6.2
This provision is not intended to prohibit a facility from having extra numbers or types of fire extinguishers provided that the code minimum rated portable fire extinguishers are provided at the specified travel distances. [30A:A.9.2.5.2]

42.7.2.6.2.1
Each motor fuel dispensing facility or repair garage shall be provided with fire extinguishers installed, inspected, and maintained as required by Section 13.6. Extinguishers for outside motor fuel dispensing areas shall be provided according to the extra (high) hazard requirements for Class B hazards, except that the maximum travel distance to an 80 B:C extinguisher shall be permitted to be 100 ft (30.48 m). Portable fire extinguishers shall be selected, installed, inspected, and maintained in accordance with Section 13.6 and 42.7.2.6.2 through 42.7.2.6.2.8. [30A:9.2.5.2.1]

42.7.2.6.2.2
All portable fire extinguishers installed to achieve compliance with this Code shall be a minimum of 10 lb (4.54 kg) ABC dry chemical having an agent discharge rate of 1 lb/sec (0.45 kg/sec) or greater.

[30A:9.2.5.2.2]

42.7.2.6.2.3
The maximum travel distance from a minimum 20 lb (9.1 kg) ABC dry chemical extinguisher having an agent discharge rate of 1 lb/sec (0.45 kg/sec) or greater shall be permitted to be 100 ft (30.5 m).

[30A:9.2.5.2.3]

42.7.2.6.2.4 New Fire Extinguishers.
Newly installed fire extinguishers, including replacements or exchanges, shall meet the requirements of 42.7.2.6.2. [30A:9.2.5.2.4]

42.7.2.6.2.5 Repair Garages.

42.7.2.6.2.5.1
At least one portable fire extinguisher shall be provided in any repair garage. [30A:9.2.5.2.5.1]

42.7.2.6.2.5.2
The maximum travel distance from any point in the vehicle service area to a portable fire extinguisher shall not exceed 50 ft (15 m). [30A:9.2.5.2.5.2]

42.7.2.6.2.6 Indoor Liquid Motor Fuel Dispensing Areas.

42.7.2.6.2.6.1
At least one portable fire extinguisher shall be provided at a position no less than 15 ft (4.6 m) but no more than 50 ft (15 m) from the fuel dispenser and within the identified path of egress from the fuel dispensing area. [30A:9.2.5.2.6.1]

42.7.2.6.2.6.2
An additional compliant extinguisher shall be provided within the egress path in cases where the travel distance and the egress requirements cannot be simultaneously met. [30A:9.2.5.2.6.2]

42.7.2.6.2.7 Outdoor Liquid Motor Fuel Dispensing Areas.
At least one portable fire extinguisher shall be provided at all fuel dispensing islands, or group of islands, so as not to exceed a maximum travel distance of 75 ft (23 m) to any single portable fire extinguisher. [30A:9.2.5.2.7]

42.7.2.6.2.8 Gaseous Fuel Dispensing Areas.
At least one portable fire extinguisher shall be provided for each gaseous fuel dispenser or group of
dispensers so as not to exceed a maximum travel distance of 50 ft (15 m) but not less than 15 ft (4.6 m)
to any single portable fire extinguisher. [30A:9.2.5.2.8]

42.7.2.6.4 *Signs.
Warning signs shall be conspicuously posted in the dispensing area and shall incorporate the following
or equivalent wording:

**WARNING:**
It is unlawful and dangerous to dispense gasoline into unapproved containers.
No smoking.
Stop motor.
No filling of portable containers in or on a motor vehicle.
Place container on ground before filling.
Discharge your static electricity before fueling by touching a metal surface away from the nozzle.
Do not re-enter your vehicle while gasoline is pumping.
If a fire starts, do not remove nozzle — back away immediately.
Do not allow individuals under licensed age to use the pump.
[30A:9.2.5.4]

A.42.7.2.6.4
The following language includes both the mandatory requirements and some optional text that could be
used to comply with the requirements in 42.7.2.6.4:

**WARNING**
It is unlawful and dangerous to dispense gasoline into unapproved containers.
No smoking.
Stop motor.
No filling of portable containers in or on a motor vehicle.
Place container on ground before filling.
Discharge your static electricity before fueling by touching a metal surface away from the nozzle.
Before using pump, touch any metal on the car away from your vehicle’s fuel filler with bare hand. This
will discharge static electricity on your body. Failure to fully discharge may ignite gasoline vapors.
Do not re-enter your vehicle while gasoline is pumping. This can re-charge your body with static
electricity. If you must re-enter your vehicle, discharge static electricity again before touching the pump
nozzle.
If a fire starts, do not remove nozzle — back away immediately and tell attendant. If no attendant is on
site, use the emergency shut-off button to stop pump.
Do not allow individuals under licensed age to use the pump.
Only persons of licensed age should use pump.
Keep children away from the pump area.
Do not allow children to use pump.
[30A:A.9.2.5.4]
42.7.2.7.1
Crankcase drainings and waste liquids shall not be dumped into sewers, into streams, or on the ground. [30A:9.2.6.1]

42.7.2.7.2
Crankcase drainings and waste liquids shall be stored in approved tanks or containers outside any building, or in tanks installed in accordance with Chapters 4 and 5 of NFPA 30A, until they can be removed from the premises. [30A:9.2.6.2]
Exception: As provided for in 42.3.3.8.3. [30A:9.2.6.1]

42.7.2.7.2
The contents of oil separators and traps of floor drainage systems shall be collected at sufficiently frequent intervals to prevent oil from being carried into sewers. [30A:9.2.6.32]

42.7 LNG Vehicle Fueling System Monitoring and Management.

42.7.7.1*
Repairs to LNG vehicles lasting 8 hours or more shall require pressure monitoring and management of the LNG tank. [30A:9.8.1]

A.42.7.7.1
This requirement would apply whether or not the LNG tank was required to be drained. Management of the LNG tank could include the use of a “captive vent” that safely conducts the boil-off gas to the atmosphere at a safe location outside the building.

42.8 Additional Requirements for CNG, LNG, Hydrogen, and LP-Gas.

42.8.1 Scope.
Section 42.8 shall apply where CNG, LNG, compressed or liquefied hydrogen, or LP-Gas, or combinations of these, are dispensed as motor vehicle fuels along with Class I or Class II liquids that are also dispensed as motor vehicle fuels. [30A:12.1]

42.8.2.1
The installation and use of CNG and LNG systems shall meet the requirements of NFPA 52, except as modified by Section 42.8. The installation and use of hydrogen systems shall meet the requirements of NFPA 2, except as modified by Section 42.8. The installation and use of LP-Gas systems shall meet the requirements of NFPA 58, except as modified by Section 42.8. [30A:12.2.1]

A.42.8.2.3
Not all fuels have equipment that is currently listed. As technology develops, this provision will allow the authorities having jurisdiction (AHJs) the latitude to approve systems and equipment that cannot be currently listed. [30A:A.12.2.3]
A.42.8.2.4
See A.12.42.8.2.3. [30A:A.12.2.4]

42.8.3.3
Aboveground tanks storing LP-Gas shall be separated from any adjacent property line that is or can be built upon, any public way, and the nearest important building on the same property by not less than the distances given in Section 6.43 of NFPA 58. [30A:12.3.3]

42.8.3.4 *
Aboveground tanks storing CNG, LNG, or LP-Gas shall be separated from each other by at least 20 ft (6 m) and from dispensing devices that dispense liquid or gaseous motor vehicle fuels by at least 20 ft (6 m). [30A:12.3.4]

42.8.3.4.1
Exception No. 1: This required separation could not apply to tanks storing or requiring separation if handling fuels of the same chemical composition. [30A:12.3.4.1]

42.8.3.4.2
Exception No. 2: When both the gaseous fuel storage and dispensing equipment are at least 50 ft (15 m) from any other aboveground motor fuel storage or dispensing equipment, the requirements of NFPA 52 or NFPA 58, whichever is applicable, shall apply. [30A:12.3.4.2]

42.8.4 Dispenser Installations Beneath Canopies.
Where CNG or LNG dispensers are installed beneath a canopy or enclosure, either the canopy or enclosure shall be designed to prevent accumulation or entrapment of ignitable vapors or all electrical equipment installed beneath the canopy or enclosure shall be suitable for Class I, Division 2 hazardous (classified) locations. [30A:12.4]

42.8.6.2 *
Table 42.8.6.2 shall be used to delineate and classify areas for the purpose of installation of electrical wiring and electrical utilization equipment. [30A:12.6.2]

<table>
<thead>
<tr>
<th>Dispensing Device</th>
<th>Extent of Classified Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed natural gas (CNG)</td>
<td>Entire space within the dispenser enclosure</td>
</tr>
</tbody>
</table>
Liquefied natural gas (LNG)

Entire space within the dispenser enclosure and 5 ft (1.5 m) in all directions from the dispenser enclosure

10 ft (3 m) in all directions from the dispenser enclosure

Liquefied petroleum gas (LP-Gas)

Entire space within the dispenser enclosure; 18 in. (46 cm) from the exterior surface of the dispenser enclosure to an elevation of 4 ft (1.22 m) above the base of the dispenser; the entire pit or open space beneath the dispenser and within 20 ft (6 m) horizontally from any edge of the dispenser when the pit or trench is not mechanically ventilated

Up to 18 in. (46 cm) above ground and within 20 ft (6 m) horizontally from any edge of the dispenser enclosure, including pits or trenches within this area when provided with adequate mechanical ventilation

[30A:Table 12.6.2]

42.9.2.2 *
Tanks that supply marine motor fuel dispensing facilities shall be located on shore or on a pier of the solid-fill type. [30A:11.2.2]

42.9.2.3
Pumps that are not integral with the dispensing device shall also be located on shore or on a pier of the solid-fill type. [30A:11.2.3]

42.9.2.4
Exception: Where tanks are located on a pier not of the solid-fill type, tanks shall be permitted with the AHJ approval of the AHJ to be located on a pier, provided the installation meets all applicable requirements of Chapters 4 and 5 of NFPA 30A and 21.6.2 of NFPA 30 and the quantity stored tank does not exceed 1100 gal (4164 L) aggregate capacity and meets Chapters 4 and 5 of NFPA 30. [30A:11.2.42]

42.9.2.5 Tanks at Elevation.

42.9.2.5.13
Where a tank is at an elevation that produces a gravity head on the dispensing device, the tank outlet shall be equipped with a device, such as a normally closed solenoid valve, that will prevent gravity flow from the tank to the dispenser. [30A:11.2.5.1]

49.9.2.5.2
This device shall be located adjacent to and downstream of the outlet valve specified by 66.22.13.1. [30A:11.2.5.2]

49.9.2.5.3
The device shall be in-stalled and adjusted so that liquid cannot flow by gravity from the tank to the dispenser if the piping or hose fails when the dispenser is not in use. [30A:11.2.5.3]
42.9.3.6
Low melting point rigid piping shall be permitted to be used between underground shore piping and a floating structure or pier and on the floating structure or pier itself, provided that the piping is protected from physical damage and stresses arising from impact, settlement, vibration, expansion, contraction, or tidal action and provided that the hose is either resistant to or shielded from damage by fire exposure. [30A:11.3.6]

42.9.4.1.1
Where hoses are attached to a hose-retrieving mechanism in a marine motor fuel dispensing facility, a listed emergency breakaway device shall not be required between the point of attachment of the hose-retrieving mechanism to the hose and the hose nozzle valve. [30A:11.4.1.1]

42.9.5.4 *
All electrical wiring for power and lighting shall be installed on the side of the wharf opposite from the liquid piping system. [30A:11.5.4]

A.42.9.5.4
Due to the unique nature of both the wiring and marine fuel piping at a marina, the systems should be protected in the event either is damaged. Protection could consist of separation, physical barriers, or other means. The intent is to prevent damaged electrical wiring from becoming an ignition source in the event of a release of flammable liquid. [30A:A.11.5.4]

42.12.1 *Scope.
Section 42.12 shall apply to the retail practice of mobile fueling of motor vehicles of the general public while the owner's motor vehicle being fueled is parked and might be unattended. [30A:14.1]

A.42.12.1
This section addresses mobile refueling activities governed by NFPA 30A. Other local, state, and federal requirements might be applicable. [30A:A.14.1]

42.12.1.2 Dispensing Class I and Class II Liquids for On-Demand Mobile Fueling.

42.12.1.2.1
The dispensing of Class I and Class II liquids from a mobile fueling vehicle or metal safety cans into the fuel tank of a motor vehicle shall be permitted only if all of the requirements of Sections 14.2 through 14.4 of NFPA 30A have been met. [30A:14.1.2.1]

42.12.1.2.2
The dispensing of all other motor fuels from mobile refueling vehicles into the fuel tanks of a motor vehicle shall be permitted only if the following requirements are met:

(1) Completion of a risk assessment and operating plan addressing the identified hazards
(2) Approval of the AHJ
42.12.2.1 Mobile fueling operations shall not be conducted unless approved by the AHJ and the owner of the property on which the fueling will occur. [30A:14.2.1]

42.12.2.2 Mobile fueling operations shall occur only at approved locations. [30A:14.2.21]

42.12.2.3 Safety and Emergency Response Plan.

A.42.12.2.2A.42.12.2.3 The safety and emergency response plan is intended to be completed, maintained, and updated by the mobile fueling operator to help ensure that fueling operations are conducted in a safe manner that is acceptable to the AHJ. Such a plan might include some or all of the following elements:

1. Written safety and emergency response plan that establishes policies and procedures for fire safety, spill prevention and control, personnel training, and compliance with other applicable requirements of this Code.

2. Where required by the AHJ, a site plan for each location at which mobile fueling occurs. The site plan should be in sufficient detail to indicate all buildings, structures, lot lines, property lines, and appurtenances on site and their use or function; all uses adjacent to the lot lines of the site; fueling locations, the locations of all storm drain openings, and adjacent waterways or wetlands; information regarding slope, natural drainage, curbing, impounding, and how a spill will be retained upon the site property; and the scale of the site plan.

3. If the AHJ does not require site plans of approved fueling locations, the safety and emergency response plan should include guidelines for locations within the jurisdiction where mobile fueling can and cannot be provided, such as on residential streets, on school grounds, and so on.

42.12.2.2.1 The AHJ shall be permitted to require a safety and emergency response plan for locations where mobile fueling is authorized. [30A:14.2.3.1]

42.12.2.3.2 When required, the safety and emergency response plan shall be available on each mobile fueling vehicle. [30A:14.2.3.2]

42.12.2.4 Training.

42.12.2.4.1 Mobile fueling vehicle operators shall possess evidence of training on proper fueling procedures and the
safety and emergency response plan. [30A:14.2.4.1]

A.42.12.2.3A.42.12.2.4.1
In addition to any other training, education, and certifications that might be required by federal regulations and HAZCOM, the operator should also be trained on the requirements of this Code. [30A:A.14.2.4.1]

42.12.2.3.42.12.2.4.2
The vehicle operator training shall be approved by the AHJ. [30A:14.2.4.2.1]

42.12.2.442.12.2.5
Mobile fueling shall not take place within 25 ft (7.6 m) (25 ft) of buildings, property lines, or combustible storage. The AHJ is authorized to decrease separation distances for mobile fueling from metal safety cans. [30A:14.2.5.4]

42.12.2.542.12.2.6
An approved storm drain cover or equivalent method that will prevent any fuel from reaching the drain shall be used when mobile fueling occurs within 7.6 m (25 ft) (25 ft) of a storm drain. [30A:14.2.6.5]

42.12.2.642.12.2.7
Mobile fueling and delivery vehicle parking shall be prohibited in buildings, and in covered parking structures, on public streets, and on public ways. [30A:14.2.7.6]

42.12.2.8
Mobile fueling operations shall be prohibited on public streets and public ways unless approved by the AHJ. [30A:14.2.8]

42.12.2.9 *
Where approved by the AHJ, mobile fueling operations conducted on public streets and public ways shall comply with Section 42.12 and the following:

1. The dispensing hose shall not cross an active traffic lane or vehicle pathway.
2. * The mobile fueling vehicle and the dispensing hose shall not encumber a marked pedestrian crossing or bicycle lane or obstruct a pedestrian walkway.
3. The mobile fueling vehicle’s hazard warning signal and flashers shall be activated during dispensing operations.
4. The AHJ shall be authorized to specify time-of-day and day-of-week limitations on mobile fueling operations. [30A:14.2.9]

A.42.12.2.8
Paragraph 42.12.2.9 provides minimum requirements to conduct on-demand mobile fueling on public roads and public ways. The AHJ can require a mobile fueling operational permit to set forth further
requirements and constraints due to local geography, culture, weather, and other considerations. In addition to the requirements in 42.12.2.9, mobile fueling operations should comply with all applicable local, state, and federal traffic safety requirements. [30A:A.14.2.9]

A.42.12.2.9(2)
A ramp over a hose is sufficient to comply with this requirement. [30A:A.14.2.9(2)]

42.12.3.1 *
Mobile fueling vehicles shall comply with all applicable local, state, and federal requirements and shall be one of the following:

(1) A tank vehicle complying with NFPA 385 with chassis-mounted tanks that do not exceed an aggregate capacity of 4542 L (1200 gal) [4542 L].
(2) A vehicle with chassis-mounted tanks, each of which does not exceed 110 gal (415 L) (110 gal), that does not exceed an aggregate capacity of 1200 gal (4542 L) (1200 gal).
(3) A vehicle that carries a maximum of 60 gal (227 L) (60 gal) of motor fuel in listed metal safety cans not to exceed 20 L (5.3 gal) [20 L] in capacity. [30A:A.14.3.1]

42.12.3.2
Dispensing hose assemblies shall be listed and the hose shall not exceed 15 m (50 ft) (15 m) in length. [30A:A.14.3.2]

42.12.3.8
Mobile fueling vehicles shall be provided with at least one fire extinguisher selected, installed, inspected, and maintained as required by NFPA 10, with a minimum rating of 4A–80 B:C. [30A:A.14.3.8]

42.12.3.8.1
The extinguisher shall be a minimum 10 lb (4.54 kg) ABC dry chemical agent–type and shall also be rated with an agent discharge rate of 1 lb/sec (0.45 kg/sec) or greater. [30A:A.14.3.8.1]

42.12.3.9
Mobile fueling vehicles shall be provided with a minimum 5 gal (18.9 L) (5 gal) spill kit designed to promptly and safely mitigate and dispose of leakage or spills. [30A:A.14.3.9]

42.12.3.11
The mobile fueling vehicles shall be fitted with 360-degree retro reflective tape or markings in compliance with 49 CFR 571.108, Lamps, Reflective Devices, and Associated Equipment. [30A:A.14.3.11]

42.12.4.1
Nighttime deliveries shall only be made in areas deemed adequately lighted by the AHJ. The source of lighting shall be permitted to originate from the mobile fueling vehicle. [30A:A.14.4.1]
42.12.4.2
The mobile fueling vehicle’s hazard warning signal and flasher lights shall be in operation while dispensing-activated during dispensing operations are in progress. [30A:14.4.2]

42.12.4.10 Inspection Program.

42.12.4.10.1
The mobile fueling operator shall have in place an approved vehicle inspection program. [30:14.4.10.1]

42.12.4.10.2
Vehicles shall be inspected prior to each shift with records available to the AHJ upon request. [30:14.4.10.2]

42.12.4.110 Operations Using Metal Safety Cans.

42.12.4.110.1
All metal safety cans shall be listed. [30A:14.4.110.1]

42.12.4.110.2
Metal safety cans shall be secured to the mobile fueling vehicle except when in use. [30A:14.4.110.2]

42.12.4.110.3
The AHJ shall be permitted to require additional measures in the handling of approved metal safety cans for refueling. [30A:14.4.110.3]

F.1.2.29 UL Publications.
UL 87A, Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0–E85), 2015.
UL 330, Hose and Hose Assemblies for Dispensing Flammable Liquids, 2017.
UL 2586, Hose Nozzle Valves, 2011.

F.3 References for Extracts in Informational Sections.
MEMORANDUM

TO: Technical Committee on Fire Code

FROM: Kelly Carey, Technical Committee Administrator

DATE: June 18, 2020

SUBJECT: NFPA 1 Proposed TIA No. 1500 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

30 Eligible to Vote
9 Not Returned (Browning, Christopherson, Day, Fangmann, Fukuda, Garris, Kluge, Myers, Taulbee)

### Technical Merit:

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<tr>
<td>Agree (w/comment: Hanselka, Peterkin)</td>
<td>21</td>
</tr>
<tr>
<td>Disagree</td>
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### Emergency Nature:

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<tr>
<td>Abstentions</td>
<td>0</td>
</tr>
<tr>
<td>Agree (w/comment: Clary, Peterkin)</td>
<td>21</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

$$[30 \text{ eligible} \div 2 = 15 + 1 = (16)]$$

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 16.

$$30 \text{ eligible to vote} - 9 \text{ not returned} - 0 \text{ abstentions} = 21 \times 0.75 = 15.75$$

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **June 23, 2020**.
**NFPA 1 TECHNICAL COMMITTEE ON FIRE CODE**

**PROPOSED TIA NO. 1500 BALLOT - FINAL RESULTS**

**QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1500 on various 30A Extract Updates to NFPA 1, Fire Code, Proposed 2021 edition.**

Eligible to Vote: 30
Not Returned : 9

F. Tom Fangmann, Brent L.
Christopher, Richard L. Day, Richard
Kluge, Steven Taulbee, Philip
Myers, Andrew Fukuda, H. Butch
Browning, Jr., Marvin Dwayne Garriss

<table>
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<tr>
<th>Vote Selection</th>
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<th>Comments</th>
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<td></td>
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<td>James S. Peterkin</td>
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<td>These changes are extracted text that have been updated in the referenced document and should be included in this document.</td>
</tr>
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<td>I AGREE with the TECHNICAL MERITS of the Proposed TIA</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>Anthony C. Apfelbeck</td>
<td>Agree</td>
<td></td>
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<tr>
<td>Richard Jay Roberts</td>
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<td>I agree that the extract should be updated.</td>
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<td>Robert J. Davidson</td>
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<tr>
<td>Scott T. Laramee</td>
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<td>I agree with the technical merits of this proposed TIA item.</td>
</tr>
<tr>
<td>Reinhard Hanselka</td>
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<td>This fills a gap in standard application</td>
</tr>
<tr>
<td>Terin Hopkins</td>
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<td></td>
</tr>
<tr>
<td>Kelly T. Nicolello</td>
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<td></td>
</tr>
<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>Kenneth Earl Tyree, Jr.</td>
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</tr>
<tr>
<td>Cesar Lujan</td>
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<td>Brian L. Olsen</td>
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**QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.**

Eligible to Vote: 30
Not Returned : 9
**Vote Selection**

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<td>These extracted text changes should be included with this upcoming edition.</td>
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<td>Shane M. Clary</td>
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<td>The proposed TIA updates extracted material that was not available at the time of the Second Draft Meeting. For the next edition of NFPA 1 to be relevant and current, the material contained within this TIA provides an updated version of the extracted text that has been in NFPA 1 for at least one cycle.</td>
</tr>
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<td>A, B, C and D</td>
<td>B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.&quot;</td>
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<tr>
<td>Scott M. Bryant</td>
<td>B</td>
<td>B. The revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
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<td>John A. Sharry</td>
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<td>Wade Palazini</td>
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<td>E. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<td>Reinhard Hanselka</td>
<td>C</td>
<td>C. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<td>Terin Hopkins</td>
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<td>F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.</td>
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<td>Agree. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
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<tr>
<td>Raymond C. O'Brocki</td>
<td></td>
<td>The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
</tbody>
</table>
A. The standard contains an error or an omission that was overlooked during the regular revision process. B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard. C. The proposed TIA intends to correct a previously unknown existing hazard. D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public. F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

Cesar Lujan

The standard contains an error or an omission that was overlooked during the regular revision process.

Brian L. Olsen
Scott T. Laramee

I agree

Disagree 0
Abstain 0
1. Revise the title of Table 25.9.2.3.1 to read as follows:

Table 25.9.2.3.1 Multiple-Row Racks of Nonencapsulated Class I Through Class IV Commodities Stored Over 25 ft (7.6 m) in Height Protected by CMDA Sprinklers at Ceiling Level

Substantiation: In NFPA 13-2016, one table (Table 16.3.1.2) addressed both the ceiling and in-rack requirements for Class I-IV commodities stored over 25 ft. (7.6 m) under CMDA sprinklers. This table covered both encapsulated and nonencapsulated commodities. While the ceiling requirements were different with and without encapsulation, the in-rack requirements were the same.

In NFPA 13-2019, the corresponding guidance was separated into two tables. Table 25.2.3.3.2 addresses the ceiling sprinklers, and Table 25.9.2.3.1 addresses the in-rack sprinklers. There was no intent to change the in-rack requirements, but without the proposed removal of the word “Nonencapsulated” from the title of Table 25.9.2.3.1, the standard no longer contains in-rack guidance for Class I-IV encapsulated commodities. The purpose of this TIA is to correct this unintended change.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process.

If this proposal is not implemented, an option for protecting a new freezer containing encapsulated Class I-IV commodities over 25 ft. (7.6 m) would be to apply the protection guideline for Group A plastics.
MEMORANDUM

TO: Technical Committee on Sprinkler System Discharge Criteria

FROM: Elena Carroll, Sr. Technical Committee Administrator

DATE: April 1, 2020

SUBJECT: NFPA 13 Proposed TIA No. 1489 FINAL TC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(a) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Technical Merit) and Ballot Item No. 2 (Emergency Nature).

36 Eligible to Vote
4 Not Returned (Keeping, Schneider, Sides, Lynch)

<table>
<thead>
<tr>
<th>Technical Merit:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>32 Agree (w comment, Baker, Jr., Corbett, Dockrill, Fouad, Klausbruckner, Stanley, Workman)</td>
<td>32 Agree (w/comment, Baker, Jr., Fouad, Klausbruckner, Stanley, Workman)</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[36 \text{ eligible ÷ 2} = 18 + 1 = (19)\]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 24.

\[(36 \text{ eligible to vote} - 4 \text{ not returned} - 0 \text{ abstentions} = 32 \times 0.75 = 24)\]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

Appeal Closing Date for this TIA is April 6, 2020.
QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1489 to Revise the title of Table 25.9.2.3.1.

Eligible to Vote: 36
Not Returned : 4
Kenneth R. Schneider, Larry Keeping, Michael D. Sides, Joseph A. Lynch

Vote Selection | Votes | Comments
--- | --- | ---
AGREE | 32 |  
Martin H. Workman | Agree | Correcting an error in the standard
Richard Pehrson | Agree | 
William E. Koffel | Agree | 
Charles O. Bauroth | Agree | 
Russell B. Leavitt | Agree | 
Kerry M. Bell | Agree | 
Kenneth E. Isman | Agree | 
Weston C. Baker, Jr. | I agree. The wording should be either "Encapsulated and Nonencapsulated" or simply remove the word "Nonencapsulated". The word "Nonencapsulated" was removed to be consistent with the 2016 wording for this table.  
Peter T. Schwab | I concur |  
Brian Mosberian | Agree |  
George W. Stanley | I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1489 to Revise the title of Table 25.9.2.3.1. |  
Mark Hopkins | Agree |  
Donald Hopkins, Jr. | Agree |  
Steven D. Wolin | Agree |  
Steven J. Scandaliato | Agree |  
Bo Bjorth | Agree |  
Abram Selim Fouad | I AGREE with the TECHNICAL MERITS of the Proposed TIA Log No. 1489 to Revise the title of Table 25.9.2.3.1 |  
Gary T. Smith | Agree |  
Chris LaFleur | Agree |  
Warren Douglas Wilson | Agree |  
Stuart Lloyd | Agree |  
Manuel Silva | Agree |  
James Dockrill | To clarify this table is to be used for Encapsulated or Nonencapsulated Class I to IV Commodities. Instead of removing "Nonencapsulated" add "Encapsulated" to the heading, or indicate in a footnote that this table covers an Encapsulated or Nonencapsulated Commodity.  
Sultan M. Javeri | agree |  
Elham (Elley) Klausbruckner | It is a simple editorial change, but has a major impact. |  
Carl P. Anderson | Agree |  
William B. Smith | Agree |  
James M. Fantauzzi | agree |  
Kevin J. Kelly | I AGREE with the TECHNICAL MERITS of this Proposed TIA. |  
Michael Six | Agree |  
Garner A. Palenske | agree |  
Jon Rodney Corbett | The change will accurately separate the original NFPA 13-2016 table 16.3.1.2 with its intent to NFPA 13-2019 table 25.9.2.3.1 |  
DISAGREE | 0 |  
ABSTAIN | 0 |  

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 36
Not Returned : 4
Kenneth R. Schneider, Larry Keeping, Michael D. Sides, Joseph A. Lynch

Vote Selection | Votes | Comments
--- | --- | ---
AGREE | 32 |  
Martin H. Workman | Agree | The change is required so lesser commodities are not subject to more conservative protection.  
Richard Pehrson | Agree |  
William E. Koffel | Agree - A | A. The standard contains an error or an omission that was overlooked during the regular revision process.  
Charles O. Bauroth | Agree |  
Russell B. Leavitt | Agree |  
Kerry M. Bell | A |  
Kenneth E. Isman | A and F |  
Weston C. Baker, Jr. | Without this change the user does not have guidance for in-rack sprinkler spacing in a multiple-row rack if the commodity is encapsulated. |  
DISAGREE | 0 |  
ABSTAIN | 0 |  

Updated: August 4, 2020
Standards Council Agenda - August 10-13, 2020
Peter T. Schwab  
Brian Mosberian  
George W. Stanley  
I concur  

Mark Hopkins  
Donald Hopkins, Jr.  
Steven D. Wolin  
Steven J. Scandaliato  
Bo Hjorth  
Abram Selim Fouad  
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.  

Gary T. Smith  
Chris LaFleur  
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box  

Warren Douglas Wilson  
Stuart Lloyd  
Manuel Silva  
James Dockrill  
Sultan M. Javeri  
Elham (Elley) Klausbruckner  
I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box  

Carl P. Anderson  
William B. Smith  
A. The standard contains an error or an omission that was overlooked during the regular revision process.  

James M. Fantauzzi  
Kevin J. Kelly  
Agree with emergency response  

Michael Six  
Garner A. Palenske  
Jon Rodney Corbett  
A.  

ABSTAIN  

Without this change there are no guidelines for in-racks for encapsulated commodities until the next edition.  

A. The standard contains an error or an omission that was overlooked during the regular revision process.  

The standard contains an error or an omission that was overlooked during the regular revision process.  

0  

0
MEMORANDUM

TO: Correlating Committee on Automatic Sprinkler Systems

FROM: Elena Carroll, Sr. Technical Committee Administrator

DATE: April 1, 2020

SUBJECT: NFPA 13 Proposed TIA No. 1489 FINAL CC BALLOT RESULTS

No comments were received on this TIA, therefore, according to 5.6(b) in the NFPA Regs, the final results show this TIA HAS achieved the ¾ majority vote needed on both Ballot Item No. 1 (Correlation Issues) and Ballot Item No. 2 (Emergency Nature).

21 Eligible to Vote
4 Not Returned (Baz, Browning, Palenske, Su)

<table>
<thead>
<tr>
<th>Correlation Issues:</th>
<th>Emergency Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Abstentions</td>
<td>0 Abstentions</td>
</tr>
<tr>
<td>17 Agree</td>
<td>17 Agree</td>
</tr>
<tr>
<td>0 Disagree</td>
<td>0 Disagree</td>
</tr>
</tbody>
</table>

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of ¾ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

\[ 21 \text{ eligible} \div 2 = 10.5 = (11) \]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is 13.

\[ 21 \text{ eligible to vote} - 4 \text{ not returned} - 0 \text{ abstentions} = 17 \times 0.75 = 12.75 \]

Ballot comments are attached for your review.

The Regs at 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with 4.2.6.

**Appeal Closing Date** for this TIA is **April 6, 2020**.
QUESTION NO. 1: I AGREE there are no CORRELATION ISSUES in accordance with 3.4.2 and 3.4.3 of the NFPA Regs.

Eligible to Vote: 21
Not Returned : 4
Joseph Su,Garner A. Palenske,Jose R. Baz,Chase A. Browning

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>William E. Koffel</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>David O. Lowrey</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Michael J. Friedman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Charles W. Ketner</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Kerry M. Bell</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Mark Hopkins</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>James D. Lake</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>J. Michael Thompson</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Adam Seghi</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Alex Hoffman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Ralph E. Bless, Jr.</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>Sultan M. Javeri</td>
<td>Agree no correlation issues</td>
<td></td>
</tr>
<tr>
<td>Jack A. Medovich</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kenneth W. Linder</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Lawrence Richard Phillips</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Steven W. Dellasanta</td>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>

DISAGREE 0

ABSTAIN 0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 21
Not Returned : 4
Joseph Su,Garner A. Palenske,Jose R. Baz,Chase A. Browning

<table>
<thead>
<tr>
<th>Vote Selection</th>
<th>Votes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>John A. LeBlanc</td>
<td>A.</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>William E. Koffel</td>
<td>A.</td>
<td>A. The standard contains an error or an omission that was overlooked during the regular revision process.</td>
</tr>
<tr>
<td>David O. Lowrey</td>
<td>Agree - A</td>
<td></td>
</tr>
<tr>
<td>Michael J. Friedman</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Charles W. Ketner</td>
<td>agree</td>
<td></td>
</tr>
<tr>
<td>Kerry M. Bell</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Mark Hopkins</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>J. Michael Thompson</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Adam Seghi</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Alex Hoffman</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Ralph E. Bless, Jr.</td>
<td>AGREE</td>
<td></td>
</tr>
<tr>
<td>Sultan M. Javeri</td>
<td>Agree - this error needs immediate action</td>
<td></td>
</tr>
<tr>
<td>Jack A. Medovich</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Kenneth W. Linder</td>
<td>Agree - reason A</td>
<td></td>
</tr>
<tr>
<td>Lawrence Richard Phillips</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Steven W. Dellasanta</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

DISAGREE 0

ABSTAIN 0